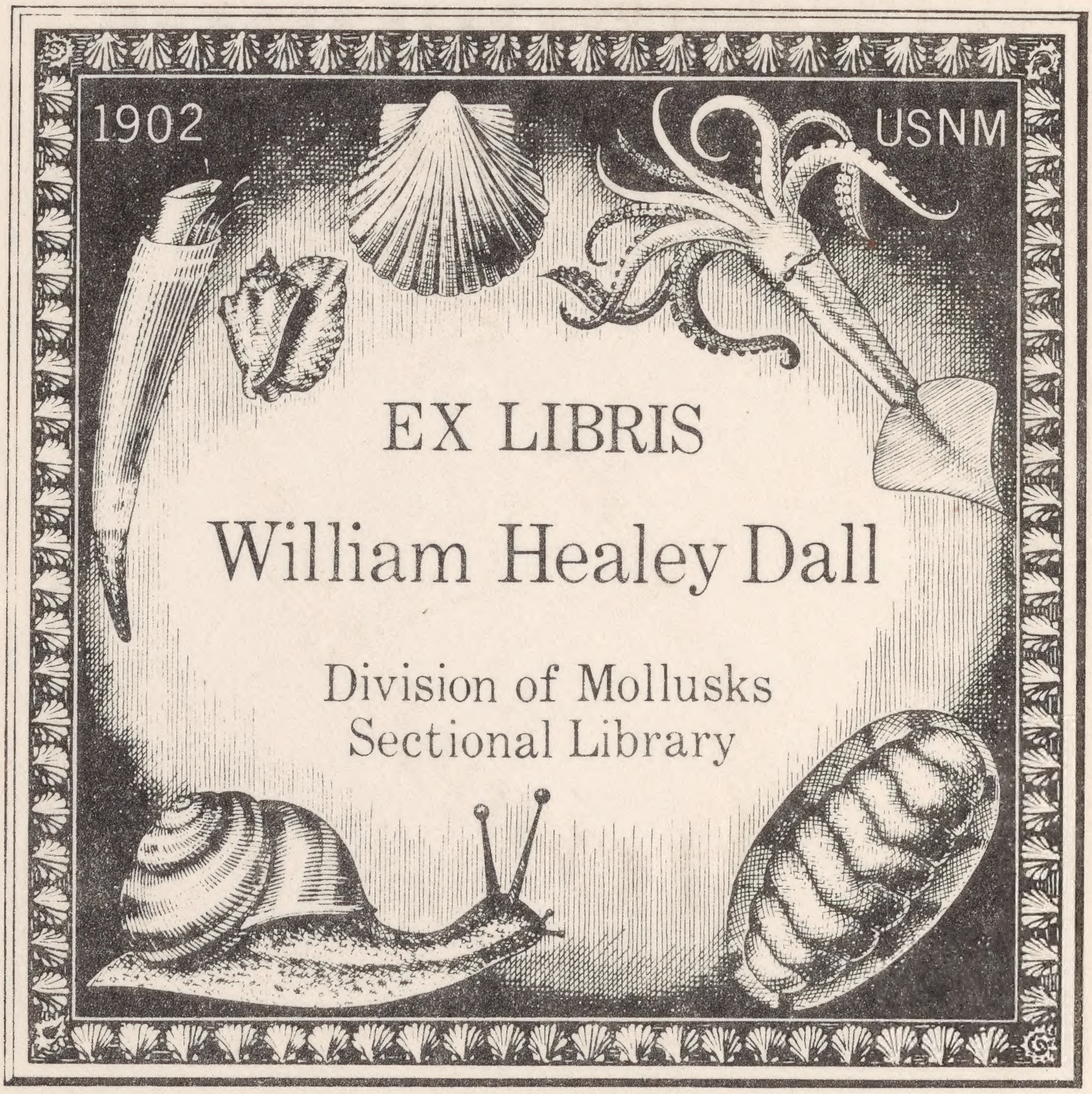

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BEING THE ORGAN OF THE

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OF GREAT BRITAIN AND IRELAND.

EDITED, UNDER THE DIRECTION OF THE COUNCIL,

BY

J. R. LE B. TOMLIN, M.A., F.R.E.S.

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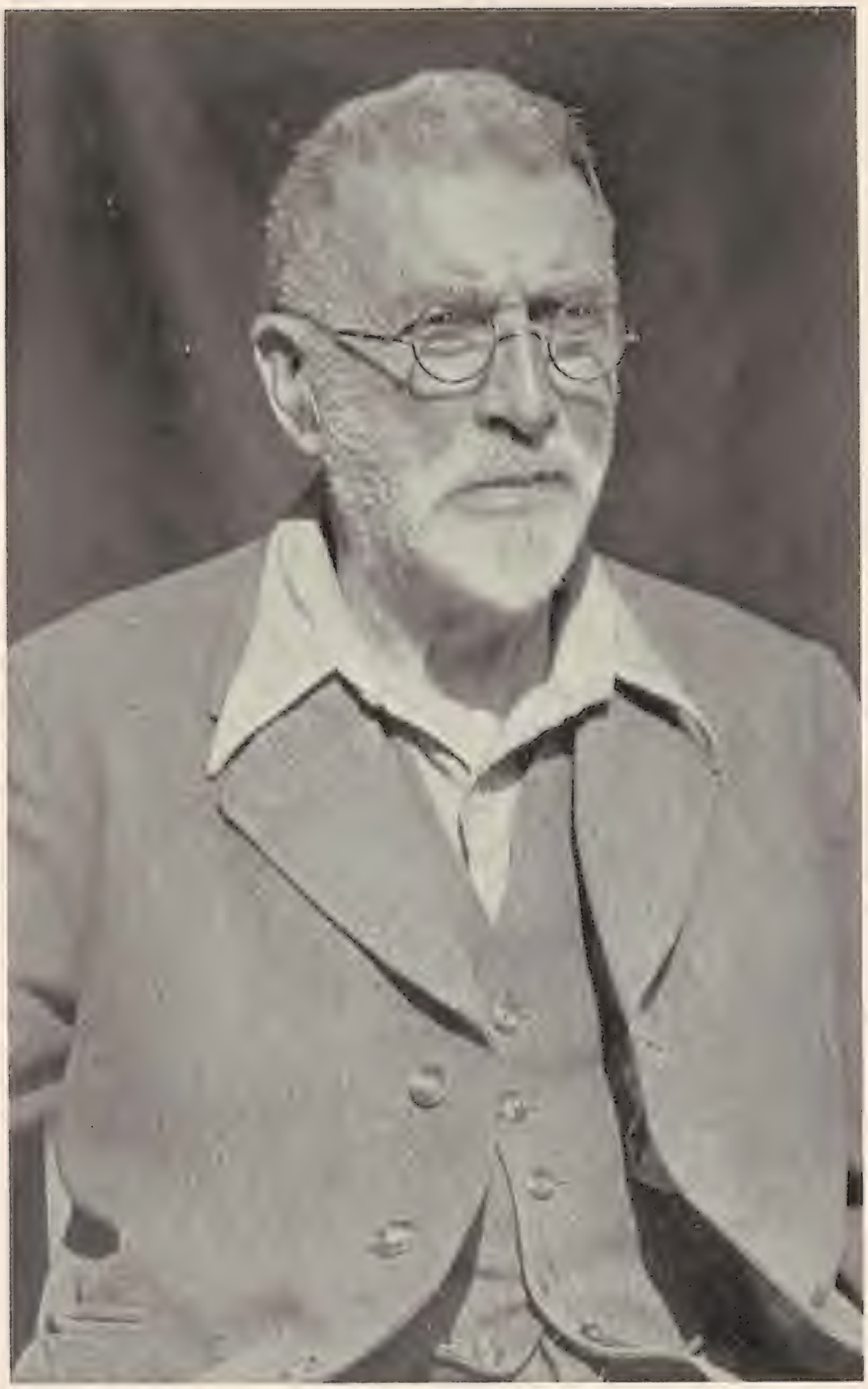


Yours very truly
Chas. Oldham

See p. 1.]

THE
JOURNAL OF CONCHOLOGY

VOL. 22. 12th JANUARY, 1943. No. 1.

CHARLES OLDHAM (1868–1942).

[Extract from *The Times* of 15th April, 1942.]

PLATE 1.

MR. CHARLES OLDHAM, a leading authority on British malacology and ornithology and a notable field naturalist, died at Berkhamsted on 13th April at the age of 73.

Oldham, the son of a Manchester merchant, was educated at Manchester Grammar School. He was placed in an insurance office at the age of 16, but business was not his choice and he entered it with a distaste which he subsequently outgrew. He became an assistant manager first in the Manchester office and then in the London office of the Commercial Union Assurance Company, and retired in 1927.

Throughout his business life his slender stock of private time was spent on his own proper study. The week-ends, the holidays, the light evenings were devoted to long tramps and watches on the hills, moors, and marshes. Aided by the natural gifts of a powerful frame, acute sight and hearing, and an exceptionally retentive memory, he developed powers of observing and locating which placed him in the first rank of field naturalists; and it was here that his genius lay. It was hardly communicable through print. His published papers were numerous and valuable; he contributed the field-notes for the 1st edition of Witherby's *Handbook of British Birds*, and the account of the *Birds of Cheshire* which he wrote in collaboration with the late T. A. Coward is a recognized classic.

But his knowledge which, within his sphere, was encyclopædic in its breadth and accuracy, had an intuitive quality, and was best displayed in his rapid and unerring identifications, his private discussions, and his work on local societies. He avoided presidencies for the same reason that he avoided dinner-parties, but at one time or another he was vice-president of the Linnean Society, the Ray Society, the British Ornithologists' Union, the British Ecological Society, and the Malacological Society, and he served on the council of the Conchological Society, the Ornithological Club, and the Freshwater Biological Association. For ten years he was the honorary secretary of the Hertfordshire Natural History Society, of which he ultimately accepted the presidency. Widely read and quickly interested, his circle was as large as he chose, but men had to seek him. Those who found him never let him go. Izaak Walton's " picture of my own disposition ", in its essential quality of a strong and gentle character at one with truth and nature, might stand for Oldham's.

He married first, in 1895, Fanny Tyas, daughter of S. A. Tyas, of Sale, who died in 1900; and second, in 1930, Dorothy, widow of his brother Roger and daughter of Charles Scorer, of Lincoln, his own native city.

The portrait was taken in August, 1941.

NOTE BY A. E. SALISBURY.

It will be of interest to add to the above a record that this Society owes more than most members perhaps realize to Oldham, apart from his many papers on British molluscs, especially those relating to *Pisidium*: he it was who founded the Research Fund by the generous gift of £100. His collection of *Pisidium* was given to the British Museum just before his death, and is kept intact for reference as the Oldham collection.

He was untiring in anything he could do to help the Society as a whole as well as its individual members. He persistently refused the presidency, but in 1917 accepted office as treasurer, and for twenty-two years directed the Society's finances with unqualified skill.

It was a happy conceit of his to complete the quarter of a century as treasurer, but by doctor's orders he had to resign his office into other hands in the autumn of 1939.

NOTE BY L. E. ADAMS.

Oldham's means and leisure enabled him to study heredity in various snails on an extensive scale. Applying the Mendelian system he produced a perfect albino line of *Planorbis corneus*, i.e. a red animal with a white shell. He also produced the rare variety *baylei* of *H. arbustorum* by mating a *canigonensis* with *flavescens*, which in the first generation yielded ordinary *arbustorum*; two of these mated yielded (*a*) brown and flecked, (*b*) brown without flecks (*canigonensis*), (*c*) yellow and flecked (*flavescens*), (*d*) yellow without flecks (*baylei*).

Quite recently he sent me four pink *Geomalacus maculosus* which he had bred from a normal specimen, the colour being due, he supposed, to the carrots on which he had fed them.

Besides ornithology he had an intimate knowledge of botany and geology and of British mammals, especially bats. On his seventieth birthday some of his naturalist friends sent him an address of congratulation and appreciation.

H. C. FULTON (1861–1942).

By A. E. SALISBURY.

ON the 11th May last, at the age of 81, there died at Ealing after a short illness a genial character in the person of Hugh Coomber Fulton, known to conchologists as one of the largest, if not the largest, dealer in molluscan shells.

Fulton was born in the Haymarket W. on the 5th April, 1861; his father, who was born in Scotland, was a school master in North Finchley and from him Hugh received his preliminary education until he attained the then school age. At the age of 15 Fulton had left school and started work in a surveyor's office in Lower Regent Street, but very shortly left and entered the employ of G. B. Sowerby (II) at his conchological establishment in Great Russell Street. When Sowerby's son, the third of the name, joined his father Fulton left and started business on his own account, during which time he taught himself French and German, realizing the necessity of knowing these languages if he was to increase his business to any extent on the Continent. He supplemented the profits of his shell business by engagements in the musical profession, being no mean performer on instruments of percussion as well as a first class flautist; he also frequently acted as steward at the Royal Albert Hall on the occasion of musical performances. At one time he ran and conducted a small orchestra of about twenty performers and later conducted the orchestra of the Hammersmith Brotherhood (Pleasant Sunday Afternoon movement) which orchestra was usually second in contests held at the Crystal Palace.

In 1897 Fulton's success and increasing competition led Sowerby to take him into partnership at 121 Fulham Road, but although Sowerby's name was one to conjure with Fulton expressed the opinion later that he would perhaps have benefited more financially had he continued on his own. The business, however, increased and both Fulton's son and daughter were pressed into service at times to act as assistants during the hey-day years of about 1903 to 1912; these later years saw the business transferred to Kew Station Road and again to still larger premises by Kew Bridge. Sowerby retired in 1916 and in 1918 Fulton moved to Ravenscourt Park, continuing there until his house was demolished by enemy action in October, 1940, when he moved to Ealing.

During the early years of this century Fulton travelled to America and on the Continent and visited most of the large collectors and museums on both sides of the Atlantic not only in a dealer's capacity but from a scientific point of view. Fulton contributed a number of papers on mollusca to the various journals at home and abroad.

Fulton's death was no doubt hastened by shock caused by the explosion which wrecked the house and through which he lost a certain amount of his stock, and although he and his wife escaped with their lives Fulton was never the same again, and it wanted but little to take him over the borderline of life. He enjoyed life to the full and was a frequent attendant at the meetings of the Malacological Society of London, on the Council of which he served and often exhibited specimens of unusual interest: he was also to be seen at the meetings of the Conchological Society when held in London. Fulton was always regarded, as one of our members put it, as a 'fair dealer' and his passing will be felt by many who looked upon him as the last representative of a notable and interesting institution—the 'Sowerby and Fulton Combine' to whose collections one had a friendly welcome at any time, no matter whether purchases were the object or not.

Fulton married twice and leaves a son and daughter by the first marriage: his second wife and two stepdaughters survive him.

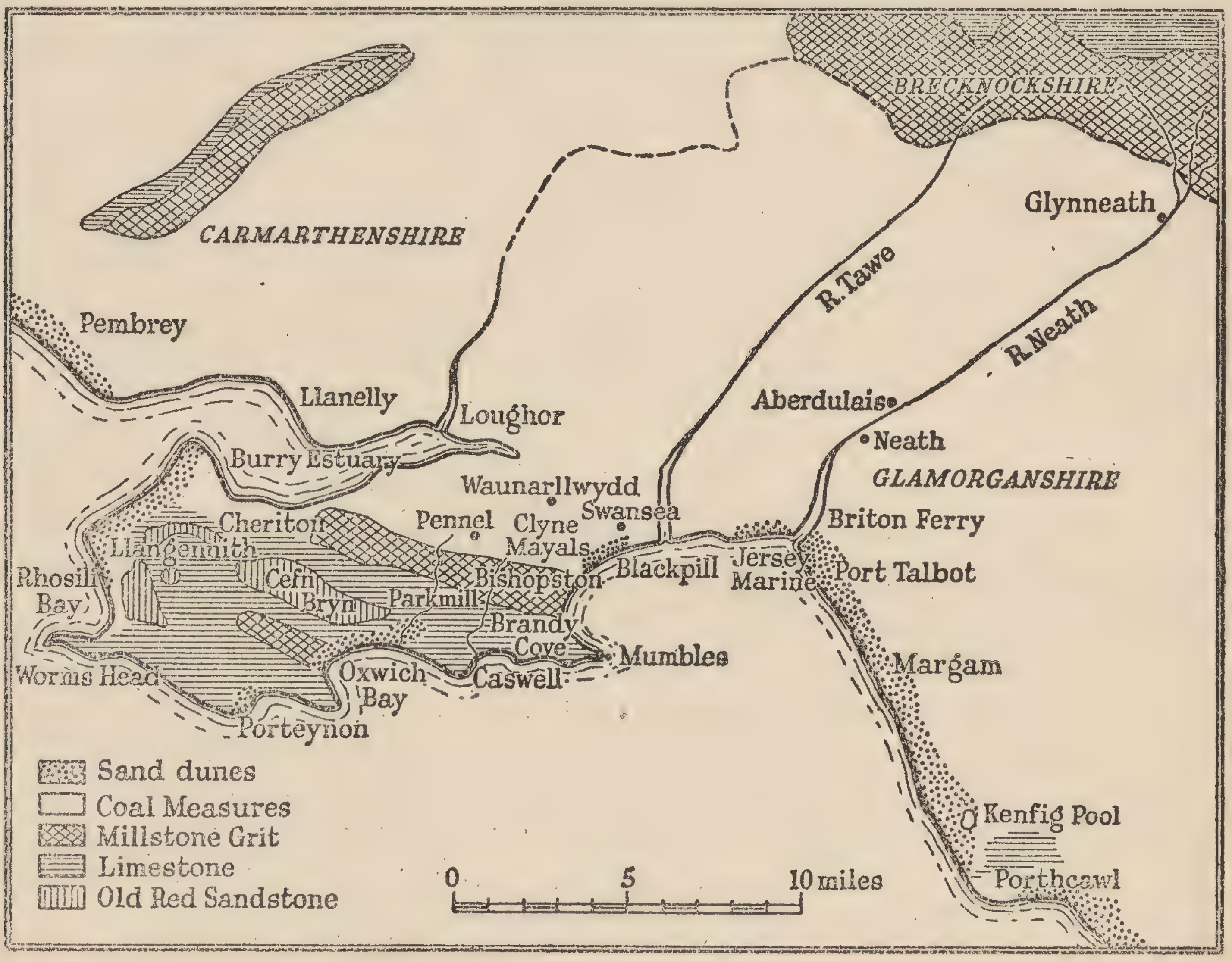
The writer of these notes although having known the late Mr. Fulton intimately is greatly indebted to his son, Mr. Stanley Fulton, for many of the facts mentioned.

LAND SNAILS AND SLUGS OF WEST GLAMORGAN.

By H. E. Quick, B.Sc., F.R.C.S.

(*Presidential Address delivered at the meeting of* 14 *February*, 1942.)

The late Professor Boycott (1934) has summarized the ecological factors in the distribution of British snails so completely, that further remarks on a regional fauna might be thought superfluous. Yet a natural desire to describe one's own familiar localities may be excused if it stimulates a train of thought in abler minds that will lead to a better understanding of fundamental biological problems, such as the nature of the processes leading to specific differentiation, distribution, and abundance and scarcity.



Dean (1923) has referred to the snails of east Glamorgan, and the present account deals with Glamorgan west of a line from Glynneath to Porthcawl. In the Gower peninsula the Old Red Sandstone crops out, forming a backbone to the region about six hundred feet above sea-level. It is flanked on the south by a Mountain Limestone plateau about two hundred feet above the sea, and descending in steep cliffs to sandy beaches. There are two areas of Millstone Grit, one near Oxwich and one near Blackpill. East of Gower the area consists of Coal Measures and Pennant Sandstone, traversed by the long straight valleys of the rivers Tawe and Neath. The northern outcrop of Mountain Limestone is seen in Carmarthenshire and Brecknock just outside the area under consideration. Considerable areas of the lower slopes of the Gower cliffs, Swansea district and the Tawe and Neath valleys are overlaid by Glacial Boulder

Clay. Mobile and fixed sand dunes, with marshes behind, occur at Llangennith, Porteynon, Oxwich, Blackpill, Briton Ferry, Port Talbot and Porthcawl. Narrow winding valleys with streams which are in parts subterranean, cut through the Limestone at Bishopston and Parkmill on the south of the Gower peninsula, and at Cheriton on the north, and there are several small dry valleys such as Caswell and Brandy Cove.

The table on pages 6, 7 shows the distribution of the sixty-nine species.

A major limestone valley, like Bishopston or Parkmill, has wooded slopes with ash, oak, thorn, hazel, wych elm, sycamore, holly, and other trees. In other parts the slopes have boulders and scree overgrown with brambles and other bushes. A stream occupies the bed of the valley, and where the valley widens towards the sea, it is bordered by damp meadows with iris and rushes. Naturally such a valley contains numerous sub-sites and many species. Caswell and Brandy Cove are dry ; so the hygrophil snails are absent.

The four valleys have yielded forty-eight species. The three missing from this total in Bishopston are *Vertigo edentula*, *Acanthinula aculeata*, and *Theba cantiana*, and of these the two former are probably faults of collecting, and *T. cantiana* is in any case not common in the area. Of the six missing from Parkmill, *Acicula lineata*, *Balea perversa*, *Cecilioides acicula*, *Oxychilus helveticum*, and *Milax gracilis* are faults of collecting, and *Succinea putris* is everywhere much less frequent than *Succinea pfeifferi*.

The limestone valleys contain no snail that is not found elsewhere in the area.

The Gower cliff plateau is separated by dry stone walls from arable land, and is clothed with short grass. The slopes are covered in places with scree more or less overgrown by brambles, gorse, hawthorn, and dwarf scrubby blackthorn, with elder, juniper, and privet in a few places. There are therefore varying sub-habitats, and the twenty-nine species are pretty much what one would expect. *Helicella virgata* and *H. caperata* occupy the open grassy places, but *Cochlicella acuta* only occurs on sand dunes. *Vertigo pygmaea*, which in this area usually lives in damp places, is also found rarely under stones on the grassy plateau. *Clausilia laminata* is found sparingly in one spot at least, where a scree slope is more thickly overgrown with bushes than usual.

The sand dunes of Porthcawl are noteworthy for *Euparypha pisana* and for the large var. *contortula* Baudon of *Succinea pfeifferi*, which swarms on the calcareous débris of *Chara* on the margins of Kenfig Pool. One day, on the drying bed of a puddle, *Lymnaea palustris*, *Succinea pfeifferi* and *Theba cantiana* were seen crawling about together, a curious association. *E. pisana* still lives at Blackpill near Swansea. At Oxwich Bay, limestone cliffs with partially besanded woods directly adjoin the dunes in some places, and in others, dunes, marshes, and besanded copses intermingle, so it is difficult at times to know which category a snail should be assigned to, and this accounts for the appearance of *Clausilia rugosa*, *Balea perversa*, and *Arion subfuscus* in the list. *Alexia myosotis* lives where spring tides flood the slacks and deposit a line of

	Gower Limestone valleys				Gower Limestone cliffs	Sand dunes and Slacks						Boulder Clay, Pennant and Millstone Grit				Inland valleys		
	1, Caswell	2, Brandy Cove	3, Bishopston	4, Parkmill		1, Kenfig	2, Jersey Marine	3, Swansea	4, Oxwich	5, Porteynon	6, Llangennith	1, Clyne Valley	2, Waunarllwyd	3, Mayals	4, Penuel	1, Aberdulais	2, Glynneath	
Pomatias elegans	1	2	3	4	1	.	.	.	.	.	6	.	.	.	.	.	.	
Acicula lineata	.	2	3	.	.	.	.	.	.	.	.	.	.	.	.	1	.	Woods near sand dunes.
Carychium minimum	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	1	.	
Carychium tridentatum	1	2	3	4	.	.	.	.	.	.	.	1	2	3	4	1	2	Woods near sand dunes.
Alexia myosotis	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	And at Cheriton.
Succinea putris	.	.	3	.	.	.	.	.	.	.	.	1	.	.	.	.	.	
Succinea pfeifferi	.	.	3	4	.	1	2	3	4	.	6	1	2	.	4	1	2	
Cochlicopa lubrica	1	2	3	4	1	1	2	3	4	5	6	1	2	3	4	1	2	
Pyramidula rupestris	1	2	3	4	1	.	.	.	.	.	.	.	.	.	.	.	.	Shingle beach at Oxwich.
Columella edentula	.	.	.	4	.	.	.	.	4	.	.	.	.	.	4	.	.	Penrice woods.
Vertigo antivertigo	.	.	3	4	.	1	.	3	4	.	.	.	.	.	4	.	.	
Vertigo substriata	.	.	.	.	.	.	.	.	.	.	.	.	2	3	.	.	.	
Vertigo pygmaea	.	.	3	4	1	.	.	3	4	.	.	.	.	3	4	.	.	
Vertigo angustior	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	? Holocene.
Pupilla muscorum	.	.	.	.	.	1	2	3	4	.	.	.	.	.	.	.	.	Stone wall at Penrice.
Lauria cylindracea	1	2	3	4	1	.	.	.	.	.	.	.	.	.	.	.	.	Mortared walls everywhere.
Acanthinula aculeata	1	2	.	4	1	.	.	.	.	.	.	.	.	3	.	.	.	Woods near sand dunes.
Vallonia pulchella	.	.	.	.	.	.	.	.	4	.	.	.	.	.	4	.	.	
Vallonia excentrica	.	.	.	.	1	.	.	3	4	.	.	.	.	.	.	.	.	
Vallonia costata	1	2	3	4	1	.	.	3	4	.	.	.	.	.	.	.	.	
Ena obscura	1	2	3	4	1	.	.	.	.	.	.	.	.	.	.	.	.	
Clausilia rugosa	1	2	3	4	1	.	.	.	4	.	.	1	2	3	4	1	2	
Clausilia laminata	1	2	3	4	1	.	.	.	.	.	.	.	.	.	.	.	.	
Balea perversa	.	.	3	.	.	.	.	.	4	.	.	.	.	.	.	.	.	Inland: elm, willow, stone walls.
Cecilioides acicula	.	.	3	.	1	.	.	.	.	.	.	.	.	.	.	.	.	Flood débris at Aberdulais.
Testacella maugei	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	Gardens: Singleton, Blackpill.
Punctum pygmaeum	.	.	.	.	.	.	.	3	4	.	.	.	.	3	.	.	.	
Goniodiscus rotundatus	1	2	3	4	1	.	.	.	.	.	.	1	2	3	4	1	2	
Vitrea crystallina	1	2	3	4	1	.	2	3	4	.	.	1	2	3	4	1	2	
Retinella nitidula	1	2	3	4	1	.	.	.	.	.	.	1	2	3	4	1	2	Woods near sand dunes.
Retinella pura	1	2	3	4	.	.	.	.	.	.	.	1	2	3	4	1	2	Woods near sand dunes.

Retinella radiatula	1	2	3	4	.	.	.	.	.	.	.	1	2	3	4	.	.	Woods near sand dunes.
Oxychilus cellarium	1	2	3	4	1	.	.	.	.	.	.	1	2	3	4	1	2	
Oxychilus lucidum	.	.	3	4	1	.	.	.	.	.	.	.	.	.	.	1	.	Woods near sand dunes.
Oxychilus alliarium	1	2	3	4	1	.	.	.	.	.	.	1	2	3	4	1	2	Woods near sand dunes.
Oxychilus helveticum	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	Woods near sand dunes.
Zonitoides nitidus	.	.	3	4	.	1	2	3	4	.	6	1	.	.	.	.	.	
Zonitoides excavatus	.	.	.	.	.	.	.	.	.	.	.	1	2	3	.	1	.	
Vitrina pellucida	1	2	3	4	.	1	2	3	4	5	6	1	2	3	4	1	2	
Arion ater	1	2	3	4	1	1	2	3	4	5	.	1	2	3	4	1	2	Woods near sand dunes.
Arion subfuscus	1	2	3	4	.	.	.	.	4	.	.	1	2	3	.	1	2	Woods near sand dunes.
Arion hortensis	1	2	3	4	.	.	.	.	.	.	.	1	2	3	4	1	2	Woods near sand dunes.
Arion circumscriptus	1	2	3	4	.	.	.	.	.	.	.	1	2	3	4	1	2	Woods near sand dunes.
Arion minimus	1	2	3	4	.	.	2	.	4	.	.	1	2	3	4	1	2	Woods near sand dunes.
Milax gagates	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	Garden at Tycoch, Swansea.
Milax sowerbyi	.	.	3	4	.	.	.	.	.	.	.	.	.	.	.	.	.	Gardens at Swansea.
Milax gracilis	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	Gardens at Swansea.
Limax maximus	.	2	3	4	.	.	.	.	.	.	.	.	.	.	.	.	.	Woods near sand dunes.
Limax cinereo-niger	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	
Limax flavus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	Garden walls, Swansea.
Limax arborum	1	2	3	4	.	.	.	.	.	.	.	1	2	3	.	1	2	Woods near sand dunes.
Agriolimax ' agrestis '	1	2	3	4	1	1	2	3	4	5	6	1	2	3	4	1	2	= *reticulatus* Müller.
Agriolimax laevis	.	.	3	4	.	1	2	3	4	5	6	1	2	3	4	1	2	
Agriolimax ? caruanae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	Gardens, woods, waste corners.
Euconulus fulvus	1	2	3	4	.	.	2	3	4	.	.	1	2	3	4	1	2	
Helicella virgata	.	.	.	.	1	1	2	3	4	5	6	.	.	.	.	.	.	
Helicella caperata	.	.	.	.	1	1	2	3	4	5	6	.	.	.	.	.	.	
Helicella itala	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	Sand dunes : Pennard, Llanmadoc.
Cochlicella acuta	.	.	.	.	.	.	.	3	.	5	.	.	.	.	.	.	.	Fairwood Common.
Theba cantiana	.	.	.	4	1	1	.	3	.	.	.	.	2	.	.	.	.	
Ashfordia granulata	1	2	3	4	.	.	2	3	4	.	.	1	.	.	.	.	.	
Hygromia fusca	.	.	.	.	.	.	.	.	.	.	.	.	.	3	4	.	.	Mumbles Road, Swansea.
Trichia hispida	1	2	3	4	1	1	2	3	4	5	.	1	2	3	.	1	2	
Trichia striolata	.	.	.	.	1	1	2	3	.	.	.	.	.	.	.	.	2	Roadsides and gardens.
Arianta arbustorum	1	2	3	4	.	.	.	.	.	.	.	.	.	.	.	.	2	
Euparypha pisana	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	And at Porthcawl.
Cepaea nemoralis	1	2	3	4	1	1	2	3	4	5	.	.	.	.	.	.	.	
Cepaea hortensis	1	2	3	4	1	.	.	.	.	.	.	1	.	.	.	.	2	
Helix aspersa	1	2	3	4	1	1	2	3	4	5	.	1	.	.	.	.	.	
Total . 69	32	34	45	42	29	16	18	25	30	11	9	28	25	27	24	25	25	

pieces of wood, cork, and débris, beneath which the snails hide. Porteynon dunes have practically no water or trees, so many species are absent, and the low total for Llangennith is mainly due to the few visits paid to this site. The sand dunes and slacks support only two species that are not found elsewhere in the area, viz. *Alexia myosotis* and *E. pisana*, as *Vertigo angustior* is probably holocene.

Of the Boulder Clay sites listed, Mayals is the most interesting. It is a shallow sloping basin facing west, about thirty yards square, wet in the centre and covered with rough grass and rushes. There are brambles on the dryer sides, and a border of oaks and hollies. No snail is abundant, and most are scarce, but the number of species found is twenty-seven, only one less than in Clyne Valley, which is a very much larger and more varied area. It is a thoroughly wild site with no mortared walls, and it is certainly unusual to find *Acanthinula aculeata* and *Zonitoides excavatus* within a few yards of one another, in such a place. *Vertigo substriata* and *Hygromia fusca* are the only species found to be confined to Boulder Clay in the area. Incidentally the site is remarkable because a land nemertine lives there (Waterston & Quick 1937), which has been identified as *Geonemertes dendyi* Dakin; it also lives at two or three other spots near by, and is the only case reported of a land nemertine living in the open in Europe, though there are a few greenhouse records.

The two large valleys of the Tawe and Neath rivers have each yielded twenty-five species, but they have not been so thoroughly explored as the Gower peninsula and the immediate neighbourhood of Swansea, so a few more species probably occur. *Limax cinereo-niger* is the only species that has not been found elsewhere in the area.

NOTES ON SOME OF THE SPECIES.

Pomatias elegans is abundant in the limestone woods and in overgrown scree on the cliffs, and scarce on besanded limestone at Llangennith.

Acicula lineata is scarce, and generally occurs under large stones that have not been disturbed for some time, and occasionally in damp moss on boulders.

Carychium minimum is much less common than *C. tridentatum*, and is more likely to be found in marshy places, while *tridentatum* occurs both in wet and in comparatively dry spots.

Vertigo angustior. Dead shells only, in sand dune pockets at Oxwich, have been found. Though some look very fresh, long search has failed to find it alive in the neighbouring slacks where *V. antivertigo* and *V. pygmaea* live. It is therefore possible that it lived on the old land surface before besanding took place. Jeffreys (1862) records it from Singleton, Swansea, but does not say whether alive or dead; I have failed to find it there.

Clausilia laminata is found sparingly in most of the limestone woods but one does not find more than three or four examples at a time, though they are well grown. This seems to be the extreme western limit of its distribution in England and Wales.

Balea perversa is not common, but occurs on elm trees inland in Gower, and on a stone wall at Penrice, and on willow trees in the slacks at Oxwich dunes. Dean (1923) says that in east Glamorgan *Balea* is common, and *Clausilia* rare. If this is so, the reverse is the case here.

Cecilioides acicula occurs at many sites on the slopes of the limestone valleys and on the cliffs, generally from 6 to 12 inches underground. It is found most easily by peeling back the turf from a miniature cliff face and burrowing down between the rock and the soil. In very wet weather it is sometimes found beneath boulders that are only embedded an inch or so in the ground. At Hill Tor, Llanmadoc, it lives in a mixture of limestone chips and blown sand, instead of the more usual mixture of reddish loam and chips in the other sites. Dead shells are found in flood débris at Aberdulais, but they may have been washed down from the northern outcrop of the limestone. Quite recently I found it living in a limestone rockery in my garden which is on Boulder Clay, but I must almost certainly have introduced it unwittingly.

Oxychilus lucidum undoubtedly occurs wild in many sites.

Oxychilus alliarium on the limestone cliffs has a pale greenish shell.

Milax gagates has only been found once on the cliffs, and that was near rubbish from neighbouring bungalows, and once in a derelict garden at Tycoch, near Swansea.

Limax flavus is found in the suburbs of Swansea, hiding by day in the drainage holes of garden retaining walls against Boulder Clay, and coming out at night to feed on lichens and algæ growing on the walls. One might live for years in its vicinity without suspecting its presence, but a flash light on warm moist nights reveals its abundance. Probably if more field work with an electric torch at night were carried out, there would be surprises relating to the abundance and scarcity of some species.

Agriolimax ' agrestis '. See Ellis (1941) where H. Watson reports that our common slug is really *A. reticulatus* (Müller), and that the true *agrestis* Linnaeus is only known so far from Norfolk and probably Scotland. All the examples examined so far from this district have proved to be *A. reticulatus*, but the matter requires further investigation.

Agriolimax ? caruanae Pollonera. H. Watson reports that examples of a slug living in Swansea gardens closely resemble this Maltese species, and that he has also received it from other parts of England and Scotland. This slug also occurs in semi-wild surroundings here at Singleton and Blackpill, in copses and waste roadside corners, and also sixteen miles away at Porteynon, in clumps of rushes in a marshy patch near cottage gardens.

Helicella itala is found only at Pennard and Llanmadoc on high limestone ground covered by blown sand, and conforms to the general experience that it is far more local than *H. virgata* and *H. caperata.* It has not been found on the low-lying dunes.

Cochlicella acuta lives on sand dunes at Porthcawl, Swansea and Porteynon. At Oxwich there are many dead shells, but no living examples have been seen. Why it has died out there is a mystery. The Swansea colony is restricted to the *E. pisana* site (see below). It has also in recent years been introduced on Fairwood Common, presumably by vehicle wheels or limestone road metal, and is established for several yards on both sides of the road at one place. The roadside banks collect limestone dust blown from the road metal, but beyond this the soil of the common is acid and peaty.

Hygromia fusca is very scarce and local in the district, and has only been found on two sites on Boulder Clay near Swansea (and one at Colbren which is just outside Glamorgan in Brecknock). It was many years before it was detected.

Euparypha pisana is abundant at Porthcawl on the dunes, but does not extend to Kenfig. Jeffreys (1862) recorded two attempts in 1862 to colonize Swansea Bay dunes with snails from Tenby. He thought that they did not survive many years, but Rimmer (1880) found them plentifully in 1874. For the last forty years at least, no living snails have been found on the dunes proper, but a small colony still survives on the seaward slope of the L.M.S. railway facing south-west, at Mumbles Road station. Beneath the turf of the dunes proper on the other side of the railway embankment, one finds 6 to 18 inches of blown sand beneath the turf, then a layer 1 inch thick, of coal dust and cinders, which appears to correspond to the land surface when the railway was built in 1863, soon after Jeffreys' experiment. Beneath the cinders there is coarse beach sand and shell grit. Immediately above and below the cinder layer shells of *E. pisana* are abundant. There are none in the sand below and only a few in the upper layers. Some still retain the pink flush inside the lip. The lower layer of gritty sand was the old sea beach and antedates the railway. Evidently the snails on the original site found it unsuitable, and died out there sometime after Rimmer's report, while emigrants to the opposite slope of the embankment have survived. The present site is only a few yards long, so their tenure must be precarious. This limited site is also the only one for *Cochlicella acuta* within several miles ; perhaps Jeffreys unwittingly introduced it from Tenby at the same time.

There are about thirty-five species of snails and slugs that have not been found in the area. Most of these are either eastern or northern species, or else very local, and need not be enumerated. There are two or three mountain tarns on the borders or just outside the area, where some of the rarer species of *Vertigo* may be awaiting discovery. The following, which might be expected, have not been found so far.

Succinea arenaria. Jeffreys' record (1862) of *S. oblonga* should probably be *S. arenaria*, for the sand dune areas of Briton Ferry and Jersey Marine resemble Braunton Burrows on the opposite coast of Devon, where it is found to-day. The three or four shells of Jeffreys labelled *oblonga*, in the National Museum of Wales, from the Welsh site, are not in good condition, but are almost certainly *arenaria*. Large portions of the locality are now industrialized, so Jeffreys' sites may be destroyed. The area left is too large for every square yard to be searched, but a fairly extensive hunt has failed to find it.

Vertigo moulinsiana also occurs at Braunton, and might turn up here.

Lauria anglica. It is strange that this snail has not been found, as it occurs in north and south Pembrokeshire.

Azeca tridens has been recorded in east Glamorgan, and it also lives near Llangorse Lake in Brecknock.

Hygromia revelata is found on the opposite coast of Devon, but apparently not on this side of the Bristol Channel.

Helicigona lapicida. Dean (1923) says that this species is common in east Glamorgan. It also occurs in Brecknock between Trecastle and Sennybridge. It is a conspicuous creature, and would probably have been found if it lived here.

Limax tenellus also occurs in Brecknock, and there seems no reason why it should not be found here as well.

GENERAL REMARKS.

In surveying such a large and diversified area as this one point that emerges clearly is that very few species are rigidly confined to one of the types of countryside that we consider distinct. It is true that *Alexia myosotis* is confined to brackish slacks, *Helicella virgata*, *caperata*, and *itala* to exposed situations on limestone, *Cochlicella acuta* to dunes, and *Pyramidula rupestris* to rocky surfaces, but the others, with the exception of the rare *Euparypha pisana*, occur in a variety of places. It is clear that from a snail's point of view, texture of soil, adequate moisture and cover, a certain minimum of calcium, and freedom from disturbance, are the most important factors. From this point of view, for *Pupilla muscorum* sand dunes and stone walls are equivalent, for *Balea perversa* trees and walls, for *Oxychilus cellarium* and *alliarium* damp leaves in woods and limestone scree on cliffs, for *Limax arborum* trees and damp rocks.

The details of structure on which the taxonomist relies for separating closely allied species seem to have little relation to habits or environment, though generic or family differences are in some cases so related. When one finds in the same bed of damp leaves half a dozen species of *Zonitidae* close together, one cannot believe that subtle differences in shell contour, sculpture and umbilicus, in radulae and jaws, and in reproductive organs, are each and all closely related to differences in the environment, and that each modification is closely adapted to a small difference in the surroundings so as to fit the species more adequately for survival. Robson and Richards (1936) discuss the bearing of similar facts on the rôle of natural selection in evolution. Differences in physiology and habit appear to be of more importance in the evolution of species than the systematist's morphological criteria, cf. *Lauria anglica* in damp places with *L. cylindracea* in dry, and *Vertigo antivertigo* with *V. pusilla*. Control of water loss in xerophils may be partly due to cell and tissue properties, but also partly to the purely mechanical effect of a better epiphragm and closer adaptation of the mouth of the shell to the substratum. If, for example, an attempt is made to adapt the mouth of a shell like *Oxychilus lucidum* to a plane surface, it will be seen that gaps are due to the forward curvature of the upper lip, to the outer lip being in advance of the true radial direction, and to the projection of the last whorl into the mouth. The first and last of these factors prevent a good occlusion even when part of the shell is allowed to project beyond the edge of the plane surface employed. The conditions in shells like *Clausilia* and *Ena* allow of a considerably closer fit, and these are often found in the field closely sealed to the substratum while the *Zonitidae* are not. Xerophils undergo long periods of inactivity in dry weather, so the power of fasting must be an adaptive one.

Yet the differences between xerophils and hygrophils must not be exaggerated. Even the so called xerophils tolerate rather than love dryness, and like the hygrophils are only active when the air is at or near the saturation point, when rocks and walls, or short grass are moist from recent rain or from dew at night. On the other hand hygrophils like *Succinea* and *Zonitoides nitidus*, when active, imbibe water and drown just like xerophils, though doubtless, when sealed up for the winter with vital processes slowed down, they survive flooding of the meadows with shallow well-aerated water.

A speeding up of sexual maturity in one part of a population could isolate it from the other just as effectually as any structural incompatibility, and so could an alteration in the absolute duration, or in the rhythm, of the behaviour leading up to coitus. Those who are not out and out mechanists can also surmise that, to some extent, psychical factors are also operative. In mammals and insects scents play a considerable rôle in attraction, so perhaps they also do so in repulsion. We could easily imagine that *O. helveticum* and *O. alliarium* would have little sex appeal for their more fastidious neighbours, and that similar differences that are not obvious to our senses may play a part in other cases.

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NOTES ON A LIST OF THE BRITISH NON-MARINE MOLLUSCA.

By HUGH WATSON, M.A.

INTRODUCTION.

IT is hoped that when conditions become more favourable the Conchological Society may be able to publish an up-to-date classified List of all the land and freshwater Mollusca that are known to occur in the British Isles, with the genera and species arranged in accordance with our knowledge of their natural relationships and named according to the International Rules of Zoological Nomenclature, the usage of the majority of modern authorities being followed in any cases which may be open to doubt.

The need for such a List has been made more evident by the fact that one of the most highly esteemed Vice-Presidents of the Society has recently contributed to this Journal [1] what might easily be mistaken for a List of this character. Indeed so easily might such a mistake be made by those who have not themselves studied classification and nomenclature that it seems advisable to point out that in this author's List the genera or species are sometimes arranged at variance with their known natural relationships or named contrary to the International Rules and the opinions of most authorities. From among the many instances that might be given to prove this and to show why the Society has been unable to adopt this author's List as its own, it will suffice to select the following examples, which will be taken in the order in which they appear in the List in question.

Order ASPIDOBRANCHIA.

In the List we are considering the whole of the operculate genera are placed in the Order Aspidobranchia. Yet in the introduction to his List the author states that he is following the arrangement of Thiele, who places the first genus, *Theodoxus*, in the Order Archaeogastropoda and the remaining operculate genera in the Order Mesogastropoda.[2] Pelseneer and some other authorities apply the name Aspidobranchia to the Order containing *Theodoxus*, but these authors place all the other genera in the Order Pectinibranchia. To include the whole of them in the Aspidobranchia is contrary to our knowledge of their anatomy and affinities.

DATES.

In the course of Article 22 of the Rules it is clearly stated that if it be desired to give the date on which a name was first published it should be separated from the author's name by a comma or by parenthesis. This Rule is repeatedly contravened on every page of the present List.

VALVATA MACROSTOMA Mörch.

Thiele places this form between the other two species of *Valvata* that occur in the British Isles, and this would certainly seem to be its natural position judging from the shell. Yet in this List *V. piscinalis* (Müll.) is placed between the present species and *V. cristata* Müll., which implies that *V. piscinalis* is to be regarded as nearer to *V. cristata* than is *V. macrostoma.* Few will be able to share this opinion. And although the natural arrangement of species is of much more scientific importance than the names we give to them, it may be added that, while Continental authorities differ widely with regard to the status of this form of *Valvata*, they nearly all seem to agree that it should be called *pulchella* Studer instead of *macrostoma* Mörch.

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[1] *Journ. of Conch.*, vol. xxi, 1941, pp. 260–274.

[2] "*Handbuch der Systemat. Weichtierkunde,*" vol. i, 1929, pp. 26 and 94.

ACME "*LINEATA* (Draparnaud)."

Assuming that there is only one species of *Acme* in the British Isles, it is difficult to accept this author's view that it is *A. lineata* (Drap.). Nine years ago Ehrmann emphasized the differences which have long been known to separate the form of *Acme* with which British collectors are familiar from the true *A. lineata* of Draparnaud, and he named our form *A. inchoata.*[3] That the differences are considerable I can testify after having examined specimens of Draparnaud's species from about six places in France, Switzerland, and the North of Italy, and examples of *A. inchoata* from as many as seventeen different localities. The true *A. lineata* (Drap.) is much larger than the British species, being usually between 3 and 4 mm. long, whereas the length of the British form varies between 2 and 2·6 mm. In the true *A. lineata* the peristome is thicker and more fully developed than in adult examples of our species, a feature especially emphasized by Ehrmann. The sinus at the top of the outer lip appears to be less narrow, and there is usually a second thickening just behind the edge of the outer lip, which the British species does not possess. The whorls are rather more flattened, especially towards the lower part of the shell, and the upper part is usually slightly more tapering in form. In the true *A. lineata* the shell is on an average slightly thicker and a little darker in colour, and possibly the sculpture may be slightly more pronounced. There also appears to be some difference in the radula, so far as I can judge by comparing Schacko's figures of the radula of Swiss specimens of *A. lineata*[4] with preparations I have made from English and Irish snails.

Our smaller thin-lipped species, however, is not confined to the British Isles, but occurs also on the south side of the English Channel. In France the area of distribution of the two species appears to overlap, and I have seen contrasting specimens of both of them from a single locality, St. Saulge in Central France. This seems to show that the differences between them cannot be due to geographical separation or to differences in climate as some have supposed.

Paladilhe, who was one of the first to describe the differences between the form found in England and the North of France and that occurring in Switzerland and Northern Italy, believed that a series of intermediate forms lived in the intervening area, and that this indicated that the two kinds were merely races of a single species.[5] My observations have certainly not tended to confirm this view. And a distinct subspecific name would still have been needed for our form, even if Paladilhe's view should have been correct.

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[3] *Die* "*Tierwelt Mitteleuropas*", vol. ii (1), "*Mollusken,*" 1933, p. 182, footnote 3.
[4] *Jahrb. d. D. Malak. Gesells.*, vol. ii, 1875, pp. 145 and 146, pl. 5, fig. III.
[5] *Rev. et Mag. de Zoologie*, ser. 2, vol. xx, 1868, pp. 182 and 183.

It is almost certain, however, that the name *A. inchoata* is not the earliest that has been applied to the smaller thin-lipped form. If only one species of *Acme* occurs in the British Isles, it should clearly be called *A. fusca* (Montagu, 1803),[6] for this specific name was founded on specimens which were collected in Bysing Wood, near Faversham, Kent, and of which a description and figures were published by Boys and Walker in 1784,[7] Montagu having merely copied this description and given the species a name. Cockerell, however, considered that two species lived in Britain,[8] and it is conceivable that the true *A. lineata* may also occur, though rarely, in the South of England. If so, Montagu's species would have to be regarded as indeterminate, as the original description and figures might apply to either, though Boys and Walker's smaller figure, intended to represent the natural size, would agree better with *A. lineata* itself, as it is about 3·2 mm. long, but the figure is such a rough one that no importance can be attached to this fact.

If Montagu's name should have to be rejected as indeterminate, the next name that was given to British specimens of *Acme* is *A. minuta* (Brown, 1827), which was based on specimens found " at Douglas Castle, Lanarkshire, amongst jungermanniæ, in the low meadow land below the old tower ".[9] It is evident that Brown's species was not the true *A. lineata*, but he considered it to be distinct from our ordinary form, describing it as being smooth, and longer in proportion to its breadth, with more rounded whorls. If this description should be accurate it is possible that *A. minuta* may be related to the various smooth species that are widely distributed on the Continent, and it may be identical with one of them.

It is to be hoped that further specimens may be obtained from the type localities of both *A. fusca* (Mont.) and *A. minuta* (Brown), and I should be very glad of the opportunity of examining specimens from either of these localities and also any British examples that are more than 2·7 mm. in length or are without the usual vertical grooves on the shell. Through the kindness of J. R. le B. Tomlin, A. S. Kennard, A. E. Ellis, D. K. Kevan, and others, I have already had the privilege of examining recent specimens of *Acme* from Ilfracombe, N. Devon ; Bagley Wood, Berkshire ; Hastings, E. Sussex ; Folkestone, E. Kent ; Scarborough, N.E. Yorkshire ; Bilston Glen, near Roslin, Midlothian ; Grange-over-Sands, N. Lancashire ; Whitesand, Peel, Isle of Man ; Kinbane, Antrim ; Enniskerry, Wicklow ; and Durrow, Queen's County ; as well as Holocene specimens from Harwich and Copford, Essex ; Grimes Graves, Norfolk ; Rosapenna, Donegal ; and Smerwick, S. Kerry. These numerous specimens show little variation, except that some are paler than others and a few from Irish localities are quite devoid of pigment ; but manifestly

[6] "*Testacea Britannica*," part 2, p. 330.

[7] "*Testacea minuta rariora . . . littoris Sandvicensis*," p. 12, pl. ii, fig. 42.

[8] *Science Gossip*, vol. xxix, 1893, p. 27.

[9] "*Illustrations of the Recent Conchology of Gr. Britain and Ireland*," ed. 2, 1840, p. 35, pl. xiv, fig. 26. (See also the first edition of the same work, 1827, pl. xli, fig. 26.)

they all belong to one species and none shows any approach to the true *A. lineata* (Drap.), nor are any without the usual sculpture. Therefore, until we have better evidence that more than one species of *Acme* occurs in England and that the true *A. lineata* is not confined to the Continent, it might seem well to assume that the specimens Montagu named *A. fusca* belonged to our ordinary species and that therefore his name should be used for it rather than any later one.

"*PERINGIA*" *ULVÆ* (Pennant).

The differences that separate the group to which this form belongs from the typical species of *Hydrobia* are so few and unimportant that Thiele does not even rank it as a distinct subgenus, but regards it as a section of *Hydrobia* itself.[10] It therefore seems somewhat inconsistent that in this List it should be treated as a distinct genus, notwithstanding that *Marstoniopsis* Altena, 1936, of which *H. steinii* v. Mts. is the type, is not separated from *Bythinella*, although in this instance C. O. van Regteren Altena has shown that marked anatomical differences exist even though they are not very large.[11]

In any case, however, *H. ulvæ* and three or four other species included in this List can scarcely be truthfully described as non-marine, but have been rightly included by Winckworth in the List of British Marine Mollusca.[12] If it be desired to include in a List of Land and Freshwater Mollusca species that do not occur either on land or in fresh water merely because they are often found in the brackish waters of estuaries, surely their names should at least be qualified by some distinguishing letter or mark.

"BITHYNIIDÆ."

The genus to which this author still applies the familiar name *Bithynia* resembles the Hydrobiidæ in so many respects that Thiele and others include it in this family, merely placing it in a separate subfamily on account of its calcareous operculum.[13] Seeing that in this List the families are not grouped into super-families or stirpes, to place this genus in a distinct family implies that the differences which separate it from the Hydrobiidæ are comparable in importance with those which separate the Hydrobiidæ from the preceding families or which distinguish these families from one another, and this is certainly not the case.

DIVISIONS OF THE PULMONATA.

It has long been well known that the British non-marine Pulmonata belong to two very distinct groups, the Basommatophora and the Stylommatophora. Thiele ranks these as distinct Orders, and they are certainly of great importance and should appear in any classified List; yet they are entirely omitted from the List we are considering, notwithstanding the protests which reached the author while he was compiling it.

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[10] *Zoolog. Jahrbücher, Abt. f. Syst., Ökol. u. Geogr. d. Tiere*, vol. lv, 1928, p. 378; "*Handbuch d. Syst. Weichtierkunde*," vol. i, 1929, p. 138. Krull has confirmed the anatomical similarity between *H. ulvæ* (Pen.) and *H. ventrosa* (Mont.), the type of the genus (*Zoolog. Jahrbücher, Abt. f. Anat. u. Ontog. d. Tiere*, vol. lx, 1935, pp. 450 and 453).

[11] *Basteria*, vol. i, 1936, pp. 67–73, text-figs. 1–3.

[12] *Journ. of Conch.*, vol. xix, 1932, p. 221.

[13] Opp. cit., 1928, p. 355; 1929, p. 153. (See also Krull, op. cit., 1935, p. 453.)

"LEUCOPEPLA" BIDENTATA (Mont.) and "PHYTIA" MYOSOTIS (Drap.).

These two species resemble *Hydrobia ulvæ* and other forms in being only found on the seashore and in estuaries. They have therefore been rightly included by Winckworth in the List of British Marine Mollusca, and cannot properly be classed among non-marine species. It is true that they belong to the Pulmonata; but so do "*Ph.*" *denticulata* (Mont.), otherwise *ringens* (Turt.), and our British *Otina*, both of which are omitted from this List; and although the former may have been excluded on the ground that it is doubtful whether it is more than a variety of *myosotis*, there can be no question that the latter is quite distinct from all other British species.

Perhaps, however, it may be preferred to retain such forms as these, either with a distinguishing mark against their names to indicate that they are not truly non-marine, or in a short supplementary list of estuarine or semi-marine species. It may therefore be well to point out that the generic names of these two forms require revision.

Leucopepla Peile, 1926, the name adopted in this List for the genus containing *bidentata* (Mont.), is clearly invalid, because the same name was given by Kirkaldy in 1907 to a genus of insects belonging to the Hemiptera.[14]

Leuconia Gray, 1840, the name which has been more usually employed for the same genus, is also preoccupied, having been given by Grant to a sponge in 1833.[15]

Ovatella Bivona Bernardi, 1832 (of which *Ovatilla* Gray, 1847, is an obvious misspelling), is the name Thiele adopted for this genus, to which however, it does not seem to be applicable; for *Ovatella* was originally founded in February, 1832,[16] for two species, the first being *O. punctata*, which has three folds on the inner lip and is related to *myosotis* Drap., and not to *bidentata* (Mont.), while the second was *O. polita*, a much smaller form with only one columellar fold and striae within the outer lip, being apparently identical with *Odostomia conoidea* Brocchi, 1814, a species at one time thought to belong to this group. Two months later, however, Bivona Bernardi added a third species, which he named *O. bidentata*, and it is probably owing to this species having been confused with the *bidentata* of Montagu that the name *Ovatella* came to be misapplied to the genus containing the latter form, although according to Kennard and Woodward this Sicilian species is distinct from ours.[17]

Microtralia Dall, 1894, has been suggested by Pilsbry as probably the best name for this genus, on the ground that, although *bidentata* (Mont.) may perhaps belong to a distinct subgenus, it is probably congeneric with the type of *Microtralia*, namely *M. minuscula* (Dall., 1889), which he considers to be specifically identical with *occidentalis* (Pfr., 1854), found in Cuba, Florida, the Bahamas, and Bermuda.[18] But in this species the shell is much smaller than in *bidentata* (Mont.), and is thin and translucent, although covered with spiral sculpture when in good condition. The spire is much shorter, and the aperture longer and narrower, the general form of the shell resembling that of a miniature *Tralia* or *Melampus*. And specimens from Bermuda, kindly lent to me by Lieut.-Col. Peile, show that the outer lip is characteristically curved forward, and a low, deep-seated, third fold is developed on the inner side of the aperture, above the other two, at least in some specimens. I have not had an opportunity of examining the radula of this species, but Thiele places *Microtralia* among the sections of *Melampus*, which has a different type of radula from that possessed by "*L.*" *bidentata* (Mont.); and the various conchological differences just mentioned, when taken together, seem to be sufficient to make it doubtful whether our British species should be placed in *Microtralia*. And in any case this does not appear to be the oldest generic name available for it.

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[14] *Report of Work of the Hawaiian Sugar Planters' Association: Division of Entomology*, Bulletin No. III, pp. 12 and 87.

[15] *The Lancet*, vol. i, p. 199.

[16] *Effemeridi scientifiche e letterarie per la Sicilia*, vol. i, p. 58.

[17] *Proc. Malac. Soc.*, vol. xiii, 1919, p. 137.

In several respects "*L.*" *bidentata* (Mont.) more closely resembles a group of European Tertiary species, mainly of Miocene age, some of which have long been included in the same genus as our recent species, while others have usually been placed in *Stolidoma* Deshayes, 1863,[19] or in *Stolidomopsis* Sandberger, 1874.[20] The last was originally proposed as a subgenus of *Stolidoma*, distinguished by having two marked folds on the inner lip, such as we find in *bidentata* Mont. Its type is *S. deshayesi* (Tourn.) from Middle Miocene deposits, a species which is slightly longer and narrower than *bidentata*, the whorls being more flattened. On the other hand, *S. mayeri* (Tourn.), of the same age, is less narrow, the spire being shorter, though not so short as in *Microtralia*.[21] Tournouër states that these two species are related to the Miocene species of "*Leuconia*", *L. dujardini* Tourn. and *L. subbiplicata* (d'Orb.). *S. glandina* (Bttg.), of Oligocene and Lower Miocene age, closely resembles *S. mayeri* (Tourn.), and Wenz's figure of this species shows how similar the folds in the aperture are to those of our recent form.[22] In the shape of the shell *S. guestieri* (Degr.-Tzn.) and its varieties, from the Lower Miocene, approach *bidentata* (Mont.) still more closely,[23] and Degrange-Touzin not only compares them with *S. mayeri* and *S. deshayesi*, but states that they are certainly related to *L. subbiplicata* (d'Orb.), which is one of the fossil species that most nearly resemble *bidentata.* He describes his species as solid like our recent form, and the only important difference seems to be that in *S. guestieri* the lower or columellar fold is weaker and nearer to the upper or parietal fold than it is in any of the species already mentioned. Probably for this reason Wenz included *S. guestieri* in *Stolidoma*, s.s. ; but in the typical species of *Stolidoma*, which occur in Paleocene and Lower Eocene strata, the spire is long and tapering, the aperture is shorter and more or less oblique, the upper or parietal fold is very large and prominent, while the lower one is extremely small and deep-seated, being reduced to a kind of internal truncation of the columella, which Deshayes states cannot be easily seen except by looking into the aperture from below.[24] He also describes the shell as excessively fragile in the largest species *S. crassidens* Drap., which is usually regarded as the type of the genus.[25] It therefore seems doubtful whether the species for which the genus *Stolidoma* was originally established by Deshayes are congeneric with the later forms we have been considering ; and although they are dextral, perhaps they may be more nearly related to *Blauneria* Shuttleworth, of which more than one author has regarded *Stolidoma* as a subgenus. It is probable, however, that before *Stolidoma* itself had become extinct *Stolidomopsis* (+ "*Leuconia*") had already been evolved, and one or two of the Eocene species, such as *S. tournoueri* de Raincourt, may have been early members of the latter group. But it seems doubtful whether the Upper Paleocene species that Deshayes named *Odostomia biplicatum* has been rightly placed in *Stolidomopsis* ; while the minute "*Auricula*" *remiensis* de Boissy from Lower and Middle Paleocene deposits so closely resembles an immature *Carychium* that it seems more likely to belong to the Carychiinae than to the present group, although it has been placed in "*Leuconia*" by some authors, such as Wenz, who proposed in 1922 a new subgenus, *Palaeoleuca*, for this species.

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[18] *The Nautilus*, vol. xl, 1927, pp. 125 and 126. (Pilsbry gives 1884 as the date of *Microtralia*, and 1887 as that of *T. minuscula* Dall; but the former is an obvious error for 1894, and owing to a shortage of funds the latter part of Simpson's paper in the *Proc. Davenport Acad. Nat. Sci.*, vol. v, in which Dall's description of his species appeared, does not seem to have been published until February, 1889.)

[19] "*Description des Animaux sans Vertèbres découverts dans le Bassin de Paris*" vol. ii, p. 765.

[20] "*Land- und Süsswasser-Conchylien der Vorwelt*," p. 526.

[21] Tournouër figures both his species in *Journ. de Conchyl.*, vol. xx, 1872, pl. iii, figs. 1 and 2.

[22] *Senckenbergiana*, vol. ii, 1920, pp. 190 and 192. In "*Fossilium Catalogus, 1: Animalia*," part 21, "*Gastropoda extramarina tertiaria*," iv, 1923, p. 1170, Wenz implies that *S. glandina* is older than I have stated, but the details he gives on p. 1169 show that this is an error. He repeatedly spells the names *Stolidoma* Desh. and *Stolidomopsis* Sandb. "*Stoliodoma*" and "*Stoliodomopsis*"; but this is at variance with the original spelling of both names, as well as with the Greek word *στολίδωμα* from which Deshayes obviously derived his name, which, he says, recalls the large fold which is the most essential character of these shells.

To revise the classification of the fossil forms, however, is a task that I must leave to the palæontologists. All I wish to point out here is that, while we should hesitate before affirming that "*L.*" *bidentata* (Mont.)

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[23] *Actes de la Société Linnéenne de Bordeaux*, vol xlv (ser. 5, vol. v), 1893, pp. 152–154, pl. v, figs. 4–6.

[24] Opp. cit., p. 766.

[25] *S. crassidens* Desh.—the evident misprint "*crassideus*" on p. 766 of Deshayes' work is not repeated in the explanation of the plates—has been selected by Tate (Appendix to S. P. Woodward's *Manual of Mollusca*, 1869, p. 46), and others as the type species of *Stolidoma* Desh. But Deshayes stated that he proposed the name *Stolidoma* to take the place of *Macrodonta* Desh., 1861 (preoccupied by *Macrodonta* Costa, 1846, according to Neave), because he considered his earlier choice to be too similar to the older generic names *Macrodon* and *Macrodontes*. Therefore it would seem that *Stolidoma* should take the same type as *Macrodonta* Desh. according to Article 30 *f*, which has precedence over Article 30 *g* (type by subsequent designation) ; and the type of *Macrodonta* Desh. is undoubtedly *S. singularis* Desh., in accordance with Article 30 *c* of the International Rules. This, however, certainly does not lessen the force of the above argument.

is congeneric with the typical species of *Stolidoma* Deshayes, 1863, there appear to be no constant characters of generic importance that separate it from the species of *Stolidomopsis* Sandberger, 1874, and therefore this would seem to be the correct generic name for it if no older one should be available.

Let us now turn to the other marine Pulmonate included in this List. That "*Phytia*" Gray, 1821, is an evident misspelling of *Pythia* has already been pointed out by many writers, including B. B. Woodward in 1903.[26] This conclusion is supported by a study of Gray's original article,[27] in which the number of names that are wrongly spelt is extraordinary. For example, within five lines of "*Phytia*" we find "*Orchidium*" instead of *Onchidium*, "*Clauselia*" instead of *Clausilia*, and "*Ancyllus*" instead of *Ancylus*. Before the date when Gray wrote this article the family now known as the Ellobiidae was divided into very few genera, but *Auricula* or *Ellobium*, *Carychium*, and *Pythia* had all been established many years previously, and the last contained species with a row of denticles within the outer lip. Seeing therefore that Gray was dealing with the classification of both British and foreign forms, and yet simply divided this group into the three genera, *Auricula*, *Carychium*, and *Phytia*, indicating that "*Voluta*" *denticulata* belonged to the last, it seems quite evident that he wrote "*Phytia*" by mistake for *Pythia*, in accordance with his remarkable propensity for misspelling names, especially in this early paper. And this view is confirmed by the fact that Gray himself corrected his spelling in 1847, when he cited "*Pythia* Gray, 1821", as a synonym of *Alexia* Leach MSS., 1819, for *Vol. denticulata*.[28] Therefore those who reject "*Phytia*" Gray as an evident error seem justified in doing so according to Article 19 and Opinions 26 and 29 of the International Rules.

The next oldest name available would seem to be *Ovatella* Bivona Bernardi, 1832, mentioned above, and used by Gray for this group in 1840.[29] The species which is accepted as the type of *Ovatella*—*O. punctata* Bivona Bernardi—is nearly or more probably quite identical with *Auricula firminii* Payraudeau, 1826, the radula of which Fischer and Crosse have shown agrees with that of *myosotis* Drap., according to Odhner[30]; while its shell is also very like that of our British species, except that it is slightly larger and thicker, and the cancellate or spirally punctate sculpture extends over the lower whorls, instead of being confined to the first two after the smooth protoconch, as it is in *myosotis*.

If the validity of the name *Ovatella* for this genus should be open to question—and I have no reason to suppose that it is—the next available generic name would be *Monica* H. and A. Adams, 1855,[31] which has *firminii* as its type species; for *Alexia* Leach was not published until

[26] *Journ. of Conch.*, vol. x, p. 361.

[27] *London Medical Repository*, vol. xv, March, 1821, p. 231.

[28] *Proc. Zoolog. Soc.*, vol. xv, p. 179.

[29] New edition of Turton's "*Manual of the Land and Freshwater Shells of the British Islands*", p. 225.

[30] *Arkiv för Zoologi*, vol. xvii A, 1925, no. 6, p. 10.

[31] "*The Genera of Recent Mollusca*", vol. ii, p. 247.

1847,[32] and is therefore preoccupied by *Alexia* Stephens, 1833, as others have pointed out more than once.

Should it be considered that our British form might be placed in a separate section or subgenus from the more strongly sculptured typical species, then the name *Myosotella* Monterosato, 1906, would be available for this section or subgenus. But Monterosato considered that our two forms, *myosotis* (Drap.) and *denticulata* (Mont.) = *ringens* (Turt.)[33] belonged to distinct genera, and Wenz has taken the same view and in 1920 gave the name *Nealexia* to the genus of which *denticulata* (Mont.) is the type species,[34] *myosotis* (Drap.) being the type of *Myosotella*. These supposed genera have been thought to differ in that *Nealexia* has denticles within the shell's outer lip and *Myosotella* not. This, however, is not the case. In *myosotis* itself we frequently find one tooth inside the outer lip, and sometimes two or even three, which is as many as *denticulata* occasionally possesses, though usually this form has a larger number. And in most other respects the two forms resemble each other very closely. For example, an examination of many good specimens of each form kindly sent to me by A. E. Ellis shows that in both the shell has the same microscopical sculpture, that of the apical whorls contrasting with that of the remainder in the same way ; both have the same peculiar row of hairs below the suture when in good condition ; and the radular teeth proved to be very similar in form and number, although the teeth were slightly smaller and more delicate in *denticulata* than in *myosotis*, perhaps because the specimens were a little smaller. In my opinion, therefore, these two forms are very closely allied, and it is a mistake to place them in separate genera, or even in separate sections, as Thiele has done.

The question is, rather, whether authors such as Forbes and Hanley, and Jeffreys, were not right in regarding them as varieties of a single species. They differ in that *denticulata* (or *ringens*) lives in purer sea-water rather than in the brackish water of estuaries, and is on an average slightly smaller than *myosotis*, the whorls and aperture being usually somewhat narrower, the outer lip having within it a row of frequently as many as five or six teeth or short folds, which can be seen through the outer wall of the shell and are usually repeated at intervals, while the inner lip often has a small denticle above the three folds, the top one of which is more constantly developed than it is in *myosotis* itself. Moreover both the animal and shell are usually of a paler colour in *denticulata*.

If these differences are inherited we should probably be right in regarding the two forms as distinct but nearly related species, this being the view of authors such as Germain.[35] But intermediate specimens are sometimes found, and it is conceivable that the differences may be caused by the environment. Thus the greater salinity of the water where *denticulata* is usually found may modify the osmotic pressure so as to make the mantle-edge that secretes the shell less swollen and more wrinkled than it will be in the form living in estuaries where the salinity is less. If so, this would probably make the whorls and aperture of the shell narrower,[36] and it might also lead to the excess of calcium being deposited during pauses in growth in the form of a row of teeth within the peristome fitting into the wrinkles in the mantle-edge. Furthermore estuarine conditions might possibly increase the formation of pigment. It is greatly to be hoped that those who have the opportunity of studying these coastal forms will make carefully controlled experiments to elucidate this interesting question. Meanwhile, until such observations have been made, it would be rash to maintain that *denticulata* (Mont.) is thus merely an environmental form of *myosotis* (Drap.), and not a distinct, though nearly allied, species.

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[32] *Annals and Mag. of Nat. History*, vol. xx, Oct., 1847, p. 269.

[33] Turton, in his *Conchological Dictionary of the British Islands*, 1819, pp. 249 and 250, restricted Montagu's name *Voluta denticulata* to the form that Draparnaud had previously named *Auricula myosotis*, and gave the new name *Voluta ringens* to the other form (of which his *Voluta reflexa*, described on p. 251, appears to represent an older, more fully developed state). But although Montagu probably included both forms in his *V. denticulata*, it seems clear from his description in "*Testacea Britannica*", part 1, 1803, p. 234, and his figure in the *Supplement*, 1808, pl. xx, fig. 5, that his species was mainly founded on the form which Turton afterwards named *ringens*, and to which most authors have accordingly applied Montagu's name.

[34] *Senckenbergiana*, vol. ii, 1920, p. 190.

[35] "*Faune de France*," vol. xxii, *Moll. terr. et fluv.* (part 2), 1931, p. 562.

[36] Probably for this reason a diminution of salinity has, in the case of some other marine Mollusca, been observed to make the shell relatively shorter and broader. See Pelseneer: "*Les Variations et leur Hérédité chez les Mollusques,*" 1920, p. 564.

(*To be continued*)

GIBRALTAR *CECILIOIDES*

By J. R. le B. Tomlin.

Major Connolly has recently sent me two species of *Cecilioides* which he collected at Gibraltar in 1906.

No *Cecilioides* is mentioned as occurring there by Kobelt in *JB. deutschen Mal. Ges.*, ix, 143–151, 1882, or in this *Journal*, iv, 1–9. The latter paper purports to be a translation of the former, by Dr. Scharff, but (unless I have overlooked some other publication of Kobelt's) it is much more than that and several of the new names should be credited to Scharff and not to Kobelt.

There is, however, on p. 266 of the same volume of this *Journal* a list of additions by Ponsonby (1885) which includes the name *Caecilianella petitiana* Benoit on the authority of Dr. Boettger. This Sicilian species is very unlikely to occur at Gibraltar: one may with considerable probability suspect that Connolly's shells are the same species as Ponsonby's. They are not identical with *petitiana* which I have from Brugnone and Monterosato: it is much more likely that they are some Spanish species, and I identify them with *poupillieri* Servain, described from Granada, Cordova, and from Algeria. They came from above Alameda.

The other Gibraltar species I have utterly failed to identify and venture to describe as *Cecilioides connollyi* n.sp.

Considerably larger than any *Cecilioides* that I find described: it is unusually flat-sided, the last whorl lacking any suggestion of tumidity and constituting considerably more than half the total length of the shell, which has a distinctly turreted appearance; the number of whorls is about eight; the aperture is half the length of the last whorl and is straight-sided: apex blunt and rounded.

Alt. 10 mm.; diam. max. 2·25 mm. The length of the last whorl is 7 mm.

Hab. Signal Station Gibraltar (Connolly), dead shells only taken.

NOTE ON *H. OBVOLUTA* MÜLLER

By L. B. Langmead.

On 20th August, 1942, I was fortunate enough to find several specimens of *Helicodonta obvoluta*, both adult and young, in Rackham Wood, W. Sussex. The wood forms a narrow belt of Beech with a few Ash at the foot of a steep part of the Downs, the exact situation being two miles east of the River Arun at its nearest point, and about 1½ miles east of Amberley. Fifteen specimens were seen, in company with, amongst others, *Marpessa laminata* and an occasional *Clausilia rolphii*. The only other record for *H. obvoluta* east of the Arun is, I believe, the old one of Springhead, which is a short mile further east than Rackham Wood. As the Springhead record is of long standing the new locality may be worth a permanent note.

ACCOUNTS FOR THE YEAR ENDING 31st DECEMBER, 1942.

Income and Expenditure Account.

Dr.

	£	s.	d.	£	s.	d.
To Annual Subscriptions—						
For 1942—						
86 at 10*s*.	43	0	0			
7 at 5*s*.	1	15	0			
Arrears	28	10	0			
				73	5	0
,, Sale of Publications				6	15	5
,, Donations				5	3	0
,, Transfer from Life Membership Fund . .				15	0	0
				£100	3	5

Cr.

	£	s.	d.	£	s.	d.	£	s.	d.
By publication and distribution of *Journal*—									
Vol. XXI, Part 10	34	6	8						
Authors' Reprints	4	11	3						
				38	17	11			
Vol. XXI, Part 11	31	0	7						
Authors' Reprints	3	15	0						
				34	15	7			
							73	13	6
,, Printing and Stationery								13	7
,, Fire Insurance								10	0
,, Warehousing Stock							1	10	0
,, Subscriptions—									
Malacological Society . .				1	1	0			
Lancs. and Chesh. Fauna Com.					5	0			
Zoological Record . .					5	0			
							1	11	0
,, Bank Charges and Exchange . . .								2	4
,, Officers' Expenses							6	3	7
,, Balance, being excess of Income over Expenditure							15	19	5
							£100	3	5

Life Membership Fund.

	£	s.	d.
To Amount of Fund, 1st January, 1942 . .	355	4	0
,, Dividend and Interest	15	0	0
	£370	4	0

	£	s.	d.
By Transfer to Income and Expenditure Account	15	0	0
,, Amount of Fund, 31st December, 1942 .	355	4	0
	£370	4	0

Research Fund.

	£	s.	d.		£	s.	d.
To Amount of Fund, 1st January, 1942	313	1	5	By Amount of Fund, 31st December, 1942. Cap.	200	0	0
,, Dividend and Interest	13	14	9	,, Accumulated Interest	126	16	2
	£326	16	2		£326	16	2

BALANCE SHEET.

LIABILITIES.	£	s.	d.	£	s.	d.	ASSETS.	£	s.	d.	£	s.	d.
Annual Subscriptions in advance				10	16	8	*Investments.*						
Life Membership Fund				355	4	0	4% Funding Loan, £408 4*s.* 11*d.*, cost				350	0	0
Research Fund				326	16	2	3% Defence Bonds				200	0	0
Balance of Income and Expenditure Account—							3½% War Loan, £40 11*s.* 8*d.*, cost				40	0	0
As on 1st January, 1942	152	2	8				Cash at Banks—Nat. Prov. Bk.	50	1	3			
For 1942	15	19	5				P.O.S.B.	220	17	8			
				168	2	1					270	18	11
				£860	18	11					£860	18	11

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NOTES ON A LIST OF THE BRITISH NON-MARINE MOLLUSCA.

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(*Continued from p.* 22.)

SUBGENERA OF *LYMNÆA* AND THEIR SEQUENCE

THE British species of *Lymnæa* belong to five different subgenera, which many authors regard as distinct genera, although I scarcely think that they differ sufficiently to be given this rank. These subgenera are: 1, *Galba* Schrank, 1803 (*L. truncatula*); 2, *Leptolimnea* Swainson, 1840 (*L. glabra*); 3, *Stagnicola* Leach in Jeffreys, 1830 (*L. palustris*); 4, *Lymnæa* Lamarck, 1799, s.s. (*L. stagnalis*); 5, *Radix* Montfort, 1810 (*L. auricularia*, etc.). I have placed *Radix* last, partly because its genital ducts appear to differ more from those of *Stagnicola*, etc., than do those of *Lymnæa*, s.s., and partly because this subgenus forms a transition to the next genus *Myxas* Leach in Sowerby, 1822, of which the internal anatomy is so similar to that of *Radix* that some modern authorities unite *Myxas* therewith,[1] notwithstanding the fact that its mantle-edge is expanded over the shell. Thiele, however, while placing the first three groups in the above order, transposes the fourth and fifth, and places *Lymnæa*, s.s., last.[2] On the other hand, in the List of British non-marine Mollusca that we are considering, *L. stagnalis*, belonging to *Lymnæa*, s.s., is placed first, immediately followed by *L. truncatula* representing the subgenus *Galba*. This seems to imply that the group to which *L. stagnalis* belongs is the most primitive in the genus, for the general system adopted in this List, as in the works of Pelseneer, Thiele, and many other zoologists, is to arrange the forms in ascending order, beginning with the most primitive and ending with those that are most highly modified. *L. stagnalis*, however, is certainly very far from being the most primitive British species of *Lymnæa*.

Probably this author places *L. stagnalis* first because he likes to begin each genus with the species which for nomenclatorial purposes is regarded as the type of the genus. This artificial system, however, is quite incompatible with any natural arrangement, and the author himself does not apply this principle consistently as he does not put the type genus first in each family.

In the present List subgenera are entirely omitted however important they may be. This omission, I venture to think, is also a mistake for two reasons. In the first place, in the larger and more diversified genera, unless the species are grouped into subgenera it is impossible to show their natural relationships, and one of the purposes of such a List is to show the natural relationships of the different forms, otherwise there would be little reason for grouping the genera into families, orders and classes. Secondly, very many authors treat subgenera as if they were distinct genera, and English collectors who were only familiar with a List from which all subgenera were omitted would have difficulty in understanding the works of such authors, and might suppose that when they write simply of the species of *Galba* or *Radix* or *Gyraulus* or *Lehmannia* they were referring to foreign forms that did not occur in England, since all these names are omitted from the List.

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[1] See Feliksiak: *Zoolog. Jahrbücher, Abt. f. Syst., Ökol. u. Geogr. d. Tiere*, vol. lxxii, 1939, p. 61.

[2] "*Handbuch der Systemat. Weichtierkunde,*" vol. i (pt. 2), 1931, p. 476.

LYMNÆA LAGOTIS (Schrank), *L. OVATA* Drap., etc.

Lymnæa lagotis (Schrank) is treated in this List as a good species, distinct from *L. auricularia* (Lin.), although *L. ovata* Drap., our most abundant fresh-water Gastropod, is omitted, notwithstanding that it differs from what is now considered to be the true *L. peregra* of Müller in somewhat the same way as *L. auricularia* differs from *L. lagotis*.

It is possible that *L. lagotis* and *L. peregra* are the older and more primitive forms from which *L. auricularia* and *L. ovata* have respectively arisen and towards which they tend to revert, at least in their external characters, under conditions which are unfavourable to the growth of the animals. But if this be the case their geographical distribution suggests that *L. auricularia* arose from its progenitor at a later date than *L. ovata* did, and that it and *L. lagotis* may not yet have become more than subspecifically distinct; whereas the ubiquitous *L. ovata* probably arose earlier and may now have developed into a different species from *L. peregra*. However this may be, C. R. Boettger, who has specially studied the variation of *L. auricularia*, came to the conclusion that *L. lagotis* (Schrank) was merely a poorly developed form of this species[3]; and Boycott, who had the opportunity of dissecting *L. lagotis*, describes it as a variety of *L. auricularia* which " does not achieve the full development of its shell but matures and breeds in a juvenile form ".[4] On the other hand, Favre[5] and others state that *L. peregra* (Müll.) and *L. ovata* Drap. differ from each other in their anatomy as well as in their shell and are quite distinct species, although certain of the numerous varieties of *L. ovata*—which Germain identifies with the problematical *L. limosa* (Lin.)—occasionally simulate *L. peregra* superficially in their shells by convergence, just as some of the other varieties of this polymorphic snail sometimes simulate other species such as *L. auricularia*. Accordingly most of even the more conservative Continental authorities regard *L. ovata* (Drap.) as specifically distinct from the much less abundant form to which they restrict the name *L. peregra* (Müll.), and which differs from the ordinary *L. ovata* in its smaller but thicker shell, with a higher and more prominent spire, a rather deeper suture, slightly shouldered and laterally compressed whorls, and a much smaller aperture, as well as in the spermatheca having a short but distinct duct and (according to Favre) in the pigmentation of the various organs.

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[3] *Helios*, vol. xxx, 1930, p. 58.

[4] *Journ. of Animal Ecology*, vol. v, 1936, p. 143.

[5] *Mémoires Soc. de Physique et d'Hist. Nat. de Genève*, vol. xl, 1927, p. 243.

Further investigations are greatly needed concerning the anatomy of *L. lagotis* compared with that of *L. auricularia* and of *L. peregra* compared with that of *L. ovata*, supplemented if possible by breeding experiments. But it would seem that what little evidence we already have points to conclusions at variance with those expressed in this List.

While the form now considered to be the true *L. peregra* of Müller probably occurs in the British Isles, I do not know whether this has ever been confirmed by anatomical examination, all the specimens from numerous British and Irish localities that Boycott dissected having proved to belong to *L. ovata* (Drap.),[6] which is certainly by far the commonest member of the genus now living in our islands, as indeed might be inferred from a study of the shell alone. If, however, Kennard should be right in believing that, on the other hand, all the British fossil specimens commonly called *L. peregra* actually belonged to the true *L. peregra* of Müller,[7] this would account for their being less variable than the recent shells because, according to Favre, *L. peregra* is not nearly so variable as *L. ovata*. Less likely is Kennard's suggestion that the great variability of the recent specimens has been caused by human activities having produced abnormal habitats. The hardness, flow, depth, size, and contained vegetation of bodies of water must already have varied greatly before man appeared, and many of the lakes, rivers and streams where varieties of *L. ovata* often abound seem to have been little affected by human activities ; indeed, some of the races of *L. ovata* that are most unlike what is considered to be the true *L. peregra* occur in remote mountain lakes far from the haunts of man. Probably human enterprise has, on the whole, modified the habitats of Mollusca found on land more than of those found in fresh water, yet even our land snails have changed but little in the shape of their shells during the last two or three thousand years.

" Var." *Burnetti* Alder and " Var." *Involuta* Thompson

In the Introduction to the List it is stated that " with regard to varietal names the few included are true subspecies ". Yet a glance through the List shows that no forms are included that are given a lower rank than that of distinct species except these two, and they are treated not as subspecies but as ordinary varieties. Articles 2 and 17 of the Rules state that the names of subspecies must be trinomial with nothing between the specific and subspecific name. Accordingly, if these two forms are really subspecies, as seems highly probable,[8] they should be called *L. ovata involuta* and *L. ovata burnetti*, assuming that *L. ovata* is distinct from *L. peregra*—otherwise they should be called *L. peregra involuta* and

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[6] Op. cit. (1936), p. 412 ; and Boycott, Oldham, and Waterston : *Proc. Malac. Soc.*, vol. xx, 1932, pp. 118–121.

[7] *Proc. Malac. Soc.*, vol. xxiii, 1939, p. 311.

[8] See Diver and others : *Proc. Malac. Soc.*, vol. xxiii, 1939, pp. 303–315.

L. peregra burnetti respectively. And unless the arguments that I put forward in a previous note are unsound they should stand in this order, *involuta* coming before *burnetti*.[9]

SUBGENERA OF *PLANORBIS* AND THEIR SEQUENCE

The author of this List is certainly right in regarding *Planorbarius corneus* (Lin.), *Menetus dilatatus* (Gould), and *Segmentina* (*Hippeutis*) *complanata* (Lin.), as well as *S. nitida* (Müll.), as being all generically distinct from the remaining British Planorbidæ, a fact about which their anatomy leaves no doubt. But he seems to have been less successful in his arrangement of the remaining forms belonging to this family. These belong to five different subgenera, which many authors regard as distinct genera. According to modern researches the probable relations of the British species belonging to the Planorbidæ may be approximately as shown in the following table.

Planorbarius Dumeril, 1806 (= *Coretus* Adam. in Gray, 1847)		*P. corneus* (Lin.)
Menetus Adams, 1855		*M. dilatatus* (Gould)
Planorbis Müll., 1774	*Planorbis*, s.s. (= *Tropidiscus* Stein, 1850)	*P. carinatus* Müll. *P. planorbis* (Lin.)
	Anisus Studer, 1820	*P. vorticulus* Troschel *P. vortex* (Lin.) *P. leucostoma* Millet *P. spirorbis* (Lin.)
	Gyraulus Ag. in Charp., 1837	*P. lævis* Alder *P. albus* Müll. *P. acronicus* Fér.
	Armiger Hartm., 1842	*P. crista* (Lin.)
	Bathyomphalus Ag. in Charp., 1837	*P. contortus* (Lin.)
Segmentina Fleming, 1818	*Hippeutis* Ag. in Charp., 1837	*S. complanata* (Lin.)
	Segmentina, s.s.	*S. nitida* (Müll.)

I have included *P. spirorbis* (Lin.) in this Table because most authorities seem to regard it as specifically distinct from *P. leucostoma* Millet. Whether this is so will not be known until the anatomy of these two forms has been carefully compared, and it has been seen whether *P. leucostoma* differs anatomically from *P. spirorbis*, as the Continental species *P. septemspiralis* appears to do.[10] When the author assumed that *P. leucostoma*, *P. spirorbis*, and *P. septemspiralis* were all one species he had probably only studied their shells, and in these freshwater forms the shell varies so much with the environment that it frequently masks the more deep-seated specific differences.

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[9] *Proc. Malac. Soc.*, vol. xxiii, 1939, pp. 308 and 309.

[10] Soós, Á. : *Állattani Közlemények*, vol. xxxiv, 1937, pp. 83–7.

The valuable researches of Dr. Ápád Soós, the son of the eminent Hungarian malacologist Dr. Lajos Soós, have shown that the species of *Anisus* are more nearly related to those of *Tropidiscus*, otherwise *Planorbis*, s.s., than are those belonging to *Gyraulus*.[11] It is therefore clear that the last mentioned forms should not be intercalated between the other two groups, as has been done in this List. Continental authors frequently place the keeled species *P. vorticulus* and *P. vortex* in a separate subgenus or genus from *Anisus* itself, but Ápád Soós has shown that the anatomical distinction between these two groups is illusory,[10] and the conchological difference seems to be of very little importance. There is indeed scarcely more difference between the shells of *P. leucostoma* and *P. vortex* than there is between *P. planorbis* var. *rhombea* Turton and the typical form of *P. planorbis*, although anatomically the two latter forms are similar. Thus we might almost regard the three species *P. vorticulus*, *P. vortex*, and *P. leucostoma* as forming a parallel series to *P. carinatus*, *P. planorbis* and *P. planorbis* var. *rhombea*.

PLANORBIS ACRONICUS Fér.

Many Continental authorities regard this form as a variety or subspecies of *Planorbis albus* Müll., but as I have had no opportunity of comparing any of the internal organs of these two forms I am not qualified to express an opinion on this question. It appears evident, however, that *P. acronicus* is more nearly related to *P. albus* than it is to *P. lævis* or to any of the other species occurring in the British Isles. It therefore seems unnatural to place *P. lævis* between *P. albus* and the present form, as is done in this List.

ANCYLASTRUM, *PSEUDANCYLUS* or *ANCYLUS*

Adequately to discuss the question of the correct generic name that should be given to the commoner of our two freshwater limpets would fill too many pages of this *Journal*. It seems to me that much weight should be attached to the arguments of H. B. Baker [12] and others in favour of *Pseudancylus*. Some, however, insist that *Ancylastrum* Bourg. is the correct name to use, although Thiele [13] still thought that we should call this genus *Ancylus* Müll. The different views on this problem seem to be as irreconcilable as are those about the correct names for our two species of *Viviparus*. In a case of this kind it would be a good thing if, after considering all the arguments on both sides, the International Commission of Zoological Nomenclature would give an authoritative opinion which all of us might be persuaded to accept.

SUBGENERA OF *SUCCINEA* AND THEIR SEQUENCE

The valuable researches of Quick [14] have shown that the British species of *Succinea* belong to no fewer than four very distinct sections or subgenera, namely: (1) *Quickella* C. R. Boettger, 1939 (*S. arenaria*); (2) *Hydrophyga* Lindholm, 1927 (*S. oblonga*); (3) *Succinea*, s.s. (*S. putris*); (4) *Oxyloma* Westerland, 1885 (*S. pfeifferi* and *S. elegans*). Of these *Quickella* is probably the most distinct and is considered by C. R. Boettger to be a separate genus,[15] and it is certainly the most primitive group. Of the three remaining groups *Hydrophyga* and *Succinea*, s.s., are perhaps slightly more nearly related to each other than either of them is to *Oxyloma*, which is the most highly specialized subgenus found in Britain. Yet in this List we find the species belonging to *Hydrophyga* and *Succinea*, s.s., put at opposite ends of the genus, and those belonging to the most primitive and most specialized groups placed together in the middle. It is very disappointing to find that the results of Quick's painstaking and illuminating researches, which have been so much appreciated in Germany, should be ignored by this author, and such a different arrangement adopted instead.

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[11] Op. cit., vol. xxxii, 1935, pp. 21–46.

[12] *The Nautilus*, vol. xxxix, 1925, pp. 45–8.

[13] "*Handbuch der Systemat. Weichtierkunde*," vol. i (pt. 2), 1931, p. 482, vol. ii (pt. 4), 1935, p. 1151.

[14] *Proc. Malac. Soc.*, vol. xx, 1933, pp. 295–318, pls. 23–5.

ZUA Turton, 1831, or *COCHLICOPA* Férussac, 1821

In the present List the name *Zua* Turton is employed instead of the familiar name *Cochlicopa* Fér. because it is stated that the latter is not available under Article 28 of the Rules. But few people are likely to agree that this Article has any bearing on the name *Cochlicopa* or its availability. It deals with cases in which a genus (or species) is formed by the union of two or more genera or subgenera (or of two or more species or subspecies), and explains which of the names of the component parts is to be used for the composite genus (or species) if more than one seems to be valid. But *Cochlicopa* can scarcely be regarded as a composite genus of this kind. If it were, there is no valid generic name older than *Cochlicopa* Fér. for *C. lubrica* and its allies, and Opinion 9 states that the name given to a composite genus, even when made up wholly of older genera, may be tenable for a component part that requires a name. *Zua*, being of later date than *Cochlicopa*, would seem to be invalid according to the Law of Priority.

Some time after these notes were practically completed, however, a new paper by the author of the List, dealing with de Férussac's names, has appeared in the *Proceedings of the Malacological Society of London*, vol. xxv, pp. 111–18 (December, 1942). This paper implies that the chief reason why the author rejects various names that de Férussac gave to the subgenera of which the characters were defined in the "*Tableau Systématique de la Famille des Limaçons*" (pp. 27 and 28, or 23 and 24) is that their continued use would be at variance with two new rules which he now proposes (p. 112). But as these rules are not included in the International Code they have no validity. They seem to be based on the supposition that names such as these were proposed as substitutes for older names, and would therefore take the same types in accordance with Article 30*f*. In reality, however, de Férussac proposed them for new subgenera of his own, although most of these subgenera were sufficiently large and comprehensive to include among their species some which certain previous authors had distributed in more than one genus on conchological grounds—a course which de Férussac thought should not be followed until the animals had been shown to differ. In his introductory remarks he states (p. 15 or 11) that he had been careful to retain for various groups the generic names that previous authors had given to them when the groups at least included a notable number of the species that the authors had placed therein ; but he had not applied them to his new subgenera as the latter had often scarcely any connection with the genera established under these names. It is therefore difficult to see how the new names that de Férussac gave to his new subgenera can be rightly regarded as having been proposed as substitutes for other names in the sense required by Article 30*f*.

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[15] *Zoolog. Anzeiger*, vol. cxxvii, 1939, p. 50.

SPECIES OF *TRUNCATELLINA*

Among those parts of the List which I must leave for others to discuss is that dealing with the species of *Vertigo*, since my researches on the anatomy and genital dimorphism of this group have not extended to a critical study of the natural arrangement and proper names of the individual species. I would only remark in passing that no arrangement of these forms can be wholly satisfactory that does not give due weight to the differences in the radula, which seems to show more diversity in the genus *Vertigo* than do most of the other organs. But some protest must be made here against the treatment accorded in this List to the British representatives of the related genus *Truncatellina*, even if I have neither the knowledge nor the space fully to elucidate the problem involved.

It may be recalled that in 1916 Reinhardt [16] showed that the specific name *cylindrica* (Fér.) [17] was preferable to *minutissima* Hartmann for the species of *Truncatellina* without teeth in the aperture that is widely distributed on the Continent of Europe and has been known for more than a century to occur in the British Isles. In 1921 Pilsbry [18] accepted Reinhardt's view regarding the name of this species, but he showed that we also had a dentate form in England, of which he had received specimens from G. C. Spence, collected at Portland in Dorsetshire. Pilsbry described this form and named it *Truncatellina rivierana brittanica*, because he regarded it as a British subspecies of *T. rivierana* (Benson), originally described from Nice, with which he considered *T. strobeli* (Gredler), described from the Tyrol, to be synonymous. He stated that our form resembled the typical *T. rivierana* of Southern Europe, but that the latter had longer and stronger parietal and palatal folds and more widely spaced striæ.

In 1923 Kennard and Woodward [19] strongly supported Pilsbry's view that we thus had two species of *Truncatellina* in England. They stated that they were distinguishable from each other by several well-marked and fundamental characters which they enumerated, and that they had found no intermediate forms between them. They accepted the name *T. cylindrica* (Fér.) for the species without teeth, but they thought that the dentate form might be specifically distinct from *T. rivierana* (Bens.) and therefore simply called it *T. britannica* (Pilsbry), rightly correcting the evident mistake in the original spelling.

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[16] *Nachrichtsblatt d. Deutschen Malakozoolog. Gesells.*, vol. xlviii, pp. 158–161.

[17] Reinhardt and most of his followers seem to have overlooked the fact that the name *cylindrica* (Fér.) was published in 1807 (" *Essai d'une Méthode Conchyliologique* ", p. 52), although it was not until 1821 that de Férussac made it clear that the typical form of his species was that without teeth in the aperture (" *Tableau Systématique de la Famille des Limaçons* ", p. 68 (or 64)).

[18] " *Manual of Conchology,*" ser. 2, vol. xxvi, pp. 65–77.

[19] *Proc. Malac. Soc.*, vol. xv, pp. 294–8.

In 1926 the same authors adhered to these views,[20] and they were also adopted by Ellis in his well known work on the snails and slugs of the British Isles.[21] On the other hand Germain in 1930 [22] reduced Pilsbry's subspecies to the rank of a variety of *T. rivierana* (Bens.), which, however, he agreed was specifically distinct from *T. cylindrica* (Fér.), although, unlike Pilsbry, he considered that *T. cylindrica* itself sometimes developed rudimentary teeth in the aperture. Owing to some error he stated that the parietal and palatal folds were longer and stronger and the striæ on the shell further apart in the var. *britannica* than in the typical form of *T. rivierana*, whereas the contrary is the case.

Now, however, the author of this List, in opposition to the view so emphatically upheld by Kennard and Woodward nineteen years ago, states that it is doubtful whether there are two species of *Truncatellina* in the British Isles. He accordingly unites them, not even separating them subspecifically, and calls the joint species *T. brittanica* Pilsbry, reverting to the erroneous original spelling, notwithstanding Article 19 and Opinions 27, 41, 60, 61, 63, etc.,[23] and apparently ignoring the Law of Priority and particularly Article 28, in which it is stated that if two species or subspecies are united the oldest valid name of the components must be used for the combined species. Even if there were any doubt about the validity of the name *cylindrica* (Fér.), other names had been given to the species without teeth before 1921. But the author expresses no doubt as to whether de Férussac's name is valid for this form ; he merely says that it is better to use the name based on British specimens. If we were to adopt this principle instead of following the Rules it is to be feared that more than half the current names of British snails would have to be changed, and every species that occurs in two or more countries —as most of them do—would have to be known by a different name in each country that it inhabits.

For it is not disputed that the British species without teeth in the aperture is identical with that which is so widely distributed in Europe and is now generally known as *T. cylindrica* (Fér.). Through the kindness of A. E. Ellis I have been able to examine the shells of this form from five British localities, including some from Skegness, Lincolnshire, labelled "*cylindrica*" by the author himself, and have compared them with specimens from Germany, Switzerland, Italy, and Hungary, some of which have been kindly lent to me by J. R. le B. Tomlin, as well as with figures of French and Danish shells, and the similarity is striking. I have also compared the radula of a specimen from Edinburgh, generously given to me by D. K. Kevan, with two others I have mounted from Bex in Switzerland and Berlin, and they agree very closely, except that the Scottish specimen has twelve teeth on each side of the central one while the others each have eleven. But the Berlin example is almost certainly immature, and Odhner's admirable figure of a Swedish specimen of *T. cylindrica* from Södermanland shows twelve teeth on each side,[24] and Steenberg depicts as many as thirteen.[25] In the latter author's figure the mesocones and ectocones of most of the teeth look larger than they do in my radulæ, and the minute denticle between them is not shown on the first two laterals nor the equally minute endocone on any of them; but these differences are probably due to Steenberg having viewed the teeth from a somewhat unusual aspect, which makes the main cusps look larger and renders the minute accessory denticles even more difficult to see than they generally are. Thus there appears to be no good reason for excluding *T. cylindrica* (Fér.) from the British List.

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[20] " *Synonymy of the British Non-marine Mollusca*, pp. 126–8.

[21] " *British Snails*," 1926, pp. 152–4.

[22] " *Faune de France*," vol. xxi, Moll. terr. et fluv. (pt. 1), p. 441.

[23] It is quite evident that Pilsbry intended to apply to the British subspecies the Latin adjective for British, and that it was originally misspelt " *brittanica* " by mistake, owing to " an error of transcription, a *lapsus calami*, or a typographical error ". The practice of deliberately repeating evident spelling mistakes seems no less to be regretted than that of adopting conjectural emendations when it is doubtful what the original author intended or even whether he (or his printer) made a mistake at all.

The radula of the dentate form from the south of England—*T. britannica* Pilsbry—closely resembles that of *T. cylindrica.* The teeth seem to be identical in shape and size; the number of transverse rows is the same (about 80–95); and although immature specimens from Portland only have nine or ten teeth on each side of the central one, this is probably due to their youth, more fully grown examples from Branscombe, Devon, and from Swanage having eleven, the same number as I found in an adult Swiss specimen of *T. cylindrica* (Fér.). The slight differences between my diagrammatic figure of the genital organs of *T. britannica* from Branscombe [26] and Steenberg's drawing of those of a Danish example of *T. cylindrica* [27] are so small that they may easily be due to individual variation or to errors of observation of these minute structures. The differences in the shell, however, require more consideration.

Germain is not the only author who has believed that *T. cylindrica* itself sometimes has teeth within the aperture. But Reinhardt [28] stated that among the hundreds of specimens of *T. cylindrica* that had passed through his hands none possessed teeth, and good authorities have thought that the supposed dentate examples of *cylindrica* that have been recorded really belonged to other species. It should be remembered, however, that originally all the members of the genus *Truncatellina* probably had teeth, although some species have now lost them, and it would therefore not be surprising if a species like *T. cylindrica* occasionally retained the ancestral teeth, especially in hot or dry calcareous localities where the conditions would favour their formation. Moreover, I have myself collected in the Parc Mon Repos at Geneva and at Pallanza on Lake Maggiore specimens of *Truncatellina* with one, two, or three teeth in the aperture, which so closely resemble in their shape, size, sculpture, and colour the normal examples of *T. cylindrica* with which they were found that I cannot believe they are more than varietally distinct from them.

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[24] *Arkiv för Zoologi*, vol. xvi, 1924, no. 29, p. 3, fig. 7.

[25] "*Études sur l'Anatomie et la Systématique des Maillots*," 1925, p. 127, fig. 35.

[26] *Proc. Malac. Soc.*, vol. xv, 1923, p. 279 (description on p. 274).

[27] Op. cit. (1925), pl. xxv, fig. 1 (description on pp. 96 and 97).

[28] *Nachrichtsblatt d. Deutschen Malakozoolog. Gesells.*, vol. xlviii, pp. 158–161.

This view seems to be supported by the observations of Favre,[29] who examined large numbers of dentate specimens from various localities near Geneva and found that neither by their size nor their sculpture could they be distinguished from examples of *T. cylindrica* without teeth, with which they were connected by intermediate specimens with only one or two teeth instead of the usual three. He therefore asked whether the forms with and without teeth might not belong to the same species, and suggested that the development of the teeth might be due to the climatic conditions, high temperature favouring their secretion. He thought, however, that this view was not supported by the fact that where the two forms occurred together most of the specimens either had all three teeth or none, the intermediate shells with one or two teeth being less numerous. But it is reasonable to suppose that the factor which leads to the formation or suppression of the teeth, whether it be hereditary or environmental, would normally affect all three teeth alike, so that they would usually be either all present or all absent. In *Helix hortensis* (Müll.) the majority of the shells have five bands or none, and examples with one, two, three or four bands are less abundant ; but we do not therefore infer that the specimens with and without bands belong to distinct species.

Favre, however, did not discriminate between what I regard as the dentate variety or mutation of *T. cylindrica* (Fér.) and the true *T. rivierana* of Benson,[30] but seems to have applied to all the specimens with teeth in the aperture the name *T. rivierana* (Bens.), of which he, like Pilsbry, regarded *T. strobeli* (Gredler) as a synonym. But in my opinion Benson's form is distinct. I have examined four specimens from Northern Italy, named "*Pupilla Riveriana* Bens.", from Benson's own collection, which is incorporated in the MacAndrew collection at Cambridge, as well as five very similar shells labelled "*P Rivierana B. n.s. Nice*", which are probably the actual specimens on which Benson founded his species. These nine shells differ from *T. cylindrica* and its dentate variety in the following respects. The upper whorls seem to expand more rapidly, so that the top of the shell tends to be more obtuse and the general form still more cylindrical than it usually is in *T. cylindrica* itself. Partly for this reason the shell looks decidedly larger than the average size of *T. cylindrica*, although its measurements—about 1·8–2·0 mm. × 0·8–0·9 mm.—are only a little greater. The suture is usually rather deeper, and the last whorl is somewhat compressed laterally towards the base, though less so than in *T. claustralis* (Gredler) and not more so than in some specimens of *T. cylindrica.* The parietal tooth is not so small as it is in the dentate examples of *T. cylindrica*, and can be more clearly seen when the aperture is viewed from the front; and the tooth within the outer lip is more or less elongated horizontally instead of being round, and is more deeply seated, being a little further from the expanded outer lip, so that when the aperture is looked into directly from the front this tooth appears behind the left half of the opening instead of behind its centre as it does in the dentate variety of *T. cylindrica.* The colour is much paler, but this may be partly due to the specimens having faded. The sculpture also is much coarser than it is in any examples of *T. cylindrica* that I have seen, especially on the upper post-embryonic whorls. An examination of numerous specimens of *T. cylindrica*, collected in fourteen localities ranging from Scotland to Italy and Hungary, shows that the average number of ribs in a millimetre varies according to the locality from about thirty to forty on the upper whorls, and from about twenty-five to thirty-two on the last two, whereas in these nine specimens of *T. rivierana* the average number is about nineteen on both the upper and lower whorls. I have not been able to examine the radula of Benson's species, but the differences in the shell alone, when taken together, seem sufficient to show that it is specifically, or at least subspecifically, distinct from *T. cylindrica* (Fér.) and its dentate variety.

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[29] *Mémoires Soc. de Physique et d'Hist. Nat. de Genève*, vol. xl, 1927, pp. 221–3.

[30] *Annals and Mag. of Nat. History*, ser. 2, vol. xiii, 1854, pp. 97–9.

Through Tomlin's kindness I have also had the opportunity of examining a number of specimens of *T. rivierana* (Bens.), which he had received from Favre, and which were found associated with *T. claustralis* (Gredler) at Fort de l'Ecluse, Ain, fourteen miles south-west of Geneva. In most respects these shells agree closely with Benson's from the Riviera, but the ribs are not quite so widely spaced, the average number in a millimetre being about twenty-six on the upper and twenty-four on the lower whorls. This, however, is fewer than the average in any set of *T. cylindrica* that I have examined. The corresponding numbers in my dentate specimens of *T. cylindrica* from Geneva are about thirty-four and thirty-one or thirty-two, and the Fort de l'Ecluse shells do not resemble these in other respects, such as the shape and exact position of the tooth within the outer lip.

I am also indebted to Tomlin for the loan of a specimen of *T. strobeli* (Gredler) which is said to have come from Gredler himself and was probably collected in the Tyrol. This shell agrees even more closely with Benson's specimens of *T. rivierana* (though it is slightly smaller), the sculpture as well as its other characters being very similar. But it is not improbable that Gredler included both the dentate variety of *T. cylindrica* and this form in his *Pupa Strobeli.*[31] For he and Strobel[32] regarded *strobeli* as simply a more highly developed condition of the form without teeth—which, like most of the older authors, they called *minutissima* instead of *cylindrica*—and as not more than varietally distinct therefrom; though they differed as to which should be considered the typical form of the species, Gredler regarding the toothed one as typical and terming the other *P. strobeli* var. *minutissima*, while Strobel and his brother considered the latter to be typical and termed the dentate form *P. minutissima* mut. *strobeli.*[33] Therefore, not having seen the actual shells on which Gredler founded his species or any specimens undoubtedly collected in the exact type locality, I cannot be quite certain that *T. strobeli* (Gredler) is identical with *T. rivierana* (Benson) as is generally supposed ; but if it is, Gredler's name should apparently be used in preference to Benson's, as according to Gredler himself it was first published in June, 1853, whereas the name *T. rivierana* (Bens.) was not published until February, 1854.[34]

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[31] "Bemerkungen über einige Conchylien der Gattungen *Pupa* und *Pomatias*," in the third *Programme des Gymnasiums zu Botzen* (= Bozen or Bolzano), 1853, pp. 45–52; and *Verhandl. d. zoolog.-botan. Vereins in Wien*, vol. vi, 1856, pp. 114–16.

[32] *Giornale di Malacologia*, anno i, no. v, 1853, pp. 77 and 78.

The question, however, whether Benson's name should be rejected as a synonym of *T. strobeli* (Gredler) will not affect the British List if my views are correct ; for after carefully comparing with typical *T. rivierana* (Bens.) more than twenty specimens from Portland, kindly sent to me by Tomlin and Ellis, of the English dentate form which has usually been known as *T. britannica* Pilsbry in recent years, and similar shells from Swanage, generously given to me by H. H. Bloomer, I consider that the British form differs more from Benson's species than it does from *T. cylindrica* (Fér.), especially if we admit that in some places *T. cylindrica* itself may retain teeth, and it would seem that Kennard and Woodward [19] greatly exaggerated the differences that separate *T. britannica* from *T. cylindrica.* The average size of *T. britannica* is slightly less than that attained by *T. rivierana* at Nice and by *T. cylindrica* in some localities, but it is no smaller than the average size of *T. cylindrica* in other places, both forms ranging down to 1·5 mm. in height. The slight differences in shape mentioned by Kennard and Woodward seem to be quite inconstant ; indeed, according to Pilsbry's figure,[35] the sides of the shell happen to be slightly more arcuate in the type specimen of *T. britannica* than they usually are in *T. cylindrica*, instead of being less so. I can find no constant difference in the protoconch, nor in the convexity of the whorls and the depth of the suture, while the outer lip may be vertical or may slope slightly inward towards the base in different specimens of either form. The statement that there are two ribs to 0·1 mm. in *T. britannica* and three in *T. cylindrica*—or twenty and thirty to the millimetre respectively, as Ellis expresses it—is especially misleading. It is true that the sculpture in *T. britannica* is usually somewhat coarser than it is in specimens of *T. cylindrica* from some localities, such as those found on Arthur's Seat, Edinburgh, and the French shells figured by Pilsbry, but it is no coarser than we often find in *T. cylindrica* from other places. The average number of ribs to a millimetre in the sixteen specimens of *T. britannica* from Portland that I have been able to examine under the microscope is about thirty-five on the upper and twenty-eight on the lower whorls, and of fourteen from Swanage about thirty-four on the upper whorls and twenty-seven on the lower; and if these numbers are compared with those I have given on page 35 it will be seen that they are well within the limits of variation found in *T. cylindrica* and are much greater than the numbers characteristic of Benson's specimens of *T. rivierana*. And apart from its shape also agreeing better with that of *T. cylindrica*, the British form further differs from *T. rivierana* in that, when they are present, the tooth within the outer lip is not elongated and is situated a little further forward, as in the dentate variety of *T. cylindrica*, and the parietal tooth also resembles that of this variety in being small and inconspicuous.

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[33] *Verhandl. d. zoolog.-botan. Vereins in Wien*, vol. v, 1855, p. 162.

[34] I have not been able personally to consult Gredler's 1853 paper containing the original description of his *Pupa Strobeli*, but Strobel's review of it in the *Giornale di Malacologia* referred to above leaves little doubt that it was a valid publication, and if it were not the name would still be valid from the date of Strobel's review, as this mentions the main characters of Gredler's new species.

[35] "*Manual of Conchology*," ser. 2, vol. xxvi, 1920, pl. 8, fig. 13. A copy of this illustration has been given by Ellis : "*British Snails*," 1926, p. 152, fig. 7*b*. The inconstancy of the supposed differences in shape and size between the two forms may be seen by comparing the figures of each that Ellis has copied from Pilsbry's work with those he gives of specimens authenticated by B. B. Woodward (pl. vi, pp. 15 and 16) in which the relative proportions are almost reversed. Most specimens of *T. britannica* are intermediate in shape between the two that Ellis figures.

But *T. britannica* is not identical in every way with the toothed variety or mutation of *T. cylindrica* such as we find in some of the warmer valleys adjacent to the Alps. In the Dorset shells the peristome is slightly thicker and broader than it usually is in *T. cylindrica* and its dentate variety, which tends to make the aperture itself look slightly smaller; the colour of the shells from Portland is somewhat paler than in most specimens of *T. cylindrica*, but they are not as light as the examples of *T. rivierana* that I have seen, and the Swanage specimens are of a darker brown; the deep-seated columellar tooth is more constantly present than it is in the dentate specimens of *T. cylindrica* from Switzerland, and the other two teeth are far more frequently absent even in shells that seem to be quite fully grown. Accordingly, so far as one can judge without having seen specimens from other English localities, I should not regard *T. britannica* as a mere variety or mutation of *T. cylindrica*, but as a distinct subspecies, found locally in a few places in the south of England, where the mild climate may have favoured the retention of the teeth. It is even possible that it may be a good species, more closely related to *T. cylindrica* than to *T. rivierana* or any other species, yet distinct from it; but the close similarity of the radula and the illusory nature of most of the supposed differences in the shell seem to render this view much less probable.

It may be objected that the recorded occurrence of *T. britannica* in Went Vale, Yorkshire, does not agree well with the view suggested above. But this record requires confirmation. I have seen two sets of shells labelled "*T. britannica* Pils. Went Vale", and both are wrongly identified. In one set of five specimens I can find no teeth in the aperture, not even on the columella, although some of them show a trace of a very low, spiral, columellar fold, such as we can occasionally discern in *T. cylindrica*, the form to which these shells doubtless belong. They are chiefly characterized by the way in which the outer lip slopes inward towards the base more than usual, a feature which is also opposed to Kennard and Woodward's conception of *T. britannica*.

The other specimens similarly labelled comprise three shells of quite a different type. This form certainly has three teeth in the aperture, but the parietal tooth is far more prominent than it is in *T. britannica*, and the one within the outer lip is much more deeply seated and can only be fully seen by looking into the aperture obliquely. Moreover the outer lip is greatly thickened just behind its edge, and the sculpture is as coarse as it usually is in *T. rivierana*, although the ribs are not so far apart on the upper as they are on the lower whorls. In short, these shells are quite characteristic examples of *T. costulata* (Nilsson), a species found in Germany, Denmark, Sweden, Russia, and some of the neighbouring countries, but not at present known to inhabit the British Isles. The history of these specimens, however, shows that they have passed through many hands since they were collected, and it seems not unlikely that they may be foreign shells that have been wrongly labelled at some time. Nevertheless they are worthy of this brief description because it is quite possible that *T. costulata* may occur in Great Britain, but may have been mistaken for *T. britannica* by British conchologists with little knowledge of the foreign species of *Truncatellina*. It would be well, therefore, for collectors to keep a look out for this species. Meanwhile, however, the British List should only include the two forms already known to inhabit our islands, *T. cylindrica* (Fér.) being the more widely distributed of the two.

SEQUENCE OF SPECIES OF *VALLONIA*

More than twenty years ago I pointed out that *V. costata* (Müll.) was probably the most primitive of our three species of *Vallonia*.[36] It should accordingly be placed first, immediately after the species of *Acanthinula*, the preceding genus, if these forms are to be arranged in their natural order. *V. excentrica* Sterki, on the other hand, seems to be slightly the most specialized of the three British species and should therefore come last. To place *V. costata* last and *V. excentrica* in the middle, between it and *V. pulchella* (Müll.), does not accord with what we know of the relations of these species.

SEQUENCE OF GENERA IN THE CLAUSILIIDÆ

It is well known that the genus *Balea* closely resembles *Laciniaria* in its anatomy, and these two genera are undoubtedly very closely related to each other. In fact *Balea* might be described as a *Laciniaria* in which the animal becomes adult before the shell has become fully developed. It thus has a simple type of peristome omitting the elaborate folds and clausilium that are developed in most of the Clausiliidæ during the final stage of the shell's growth. Probably this is an advantage because *Balea* is viviparous with relatively large embryos, the extrusion of which would be impeded by obstructions in the aperture of the shell.

This close relationship of *Laciniaria* and *Balea* is recognized by Thiele [37] and others, who place *Balea* immediately after *Laciniaria*. On the other hand, the genus *Clausilia* differs considerably from these two genera in its anatomy, though most authorities still include it in the same subfamily, but place it before *Laciniaria*. Yet in this List Thiele's arrangement is rejected, and *Clausilia* is placed between *Laciniaria* and *Balea*, an arrangement which is obviously at variance with our knowledge of the natural relationships of the genera.

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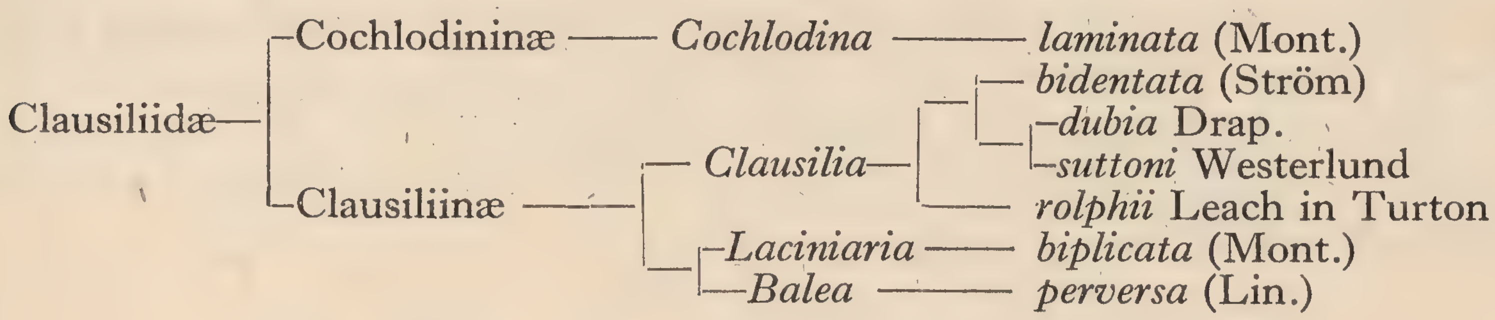
[36] *Proc. Malac. Soc.*, vol. xiv, 1920, pp. 27–9.

[37] "*Handbuch der Systemat. Weichtierkunde*," vol. i (pt. 2), 1931, pp. 538–540.

Cochlodina, which is called *Marpessa* in this List, is so very different anatomically from the other British genera of the Clausiliidæ that it is rightly placed in a separate subfamily. In placing this genus last among the British genera of the Clausiliidæ the author of this List follows Thiele, but other authorities [38] place *Cochlodina* first, and its genital organs are so much more primitive than those of the other genera that this arrangement is, I think, far more natural. Moreover, the relatively primitive character of the Cochlodininæ is confirmed by the fact that according to Wenz [39] this subfamily was the first to appear in the geological record, fossils attributed to it being known from the Cretaceous System, whereas those belonging to the Clausiliinæ are not known from earlier than Eocene times. If these views be correct the members of the Clausiliidæ that live in the British Isles may be classified according to the following table, in which I have included *C. dubia* Drap., although it does not appear in the main List that we are considering, but among the introduced species mentioned at the end.



Clausilia "*rugosa* (Drap., 1801)" or *C. bidentata* (Ström, 1765)

Continental authorities maintain that the true *C. rugosa* (Drap.) is not the form that is found in the British Isles, but one with a more rugose shell, which occurs in the South of France, and which is usually considered to be a distinct species. Their views have been disputed, but it is obviously very confusing for the same name to be given to one form in England and to another form on the Continent. Most Continental authorities employ the name *C. bidentata* (Ström, 1765) for the species that is common in the British Isles, and many English writers also use this name, which in any case is far older than the name *C. rugosa* (Drap., 1801). Moreover, the continued use of this name will cause no confusion, since, so far as I am aware, it is never applied to any other species. It is true that Germain prefers to employ the name *C. nigricans* (Pult. in Maton and Rackett) instead of *bidentata* (Ström), but probably he has been misled by the arguments of Kennard and Woodward who have maintained that *bidentata* (Ström) was so badly described that the identification of this species is impossible and it might equally well have been *C. parvula* Stüder.[40] This contention, however, will not bear examination.

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[38] E.g. Steenberg : "*Mindeskrift for J. Steenstrup*," vol. xxix, 1914, "Anatomie des Clausilies danoises," p. 42 ; Lindholm : *Proc. Malac. Soc.*, vol. xvi, 1924, p. 60 ; 1925, p. 262.

[39] "*Handbuch der Paläozoologie*," vol. vi, "Gastropoda," pt. 1, 1938, p. 55.

[40] *Proc. Malac. Soc.*, vol. xiv, 1920, pp. 84 and 85.

In his work on Norwegian insects Ström [41] gives a figure of his *Turbo bidentatus*, together with a concise description in Latin of its main characters, and a more detailed one in Norwegian, describing the form of the shell, the number of the whorls, the shape of the aperture, the character of the peristome and the folds inside it, and the shell's texture, as well as the colour of both the shell and the animal, and the kind of places in which it is found. Okland [42] has shown that Ström's figure and description will fit no other species that lives in the region of which he is describing the fauna, but only the form that we are considering, which occurs in large numbers in Norway. On the other hand, *C. parvula* Stüder he states does not occur in that country at all. It is therefore quite evident that the name *Clausilia bidentata* (Ström) is correctly applied to the species to which it has commonly been given. If the names of species had to be discarded merely because their descriptions might also be applicable to other forms found in other countries, a large number of the older names would need to be changed, and this would be contrary to Opinion 52 in which it is stated that the locality as well as the description must be taken into consideration. Seeing, therefore, that the name *C. bidentata* (Ström) has many years' priority over *C. rugosa* (Drap.), it seems to be clear that those who wish to follow the International Code should adopt Ström's name for the British species whether the true *C. rugosa* of Draparnaud be identical with it or not, and we have already seen that those who wish to avoid creating or perpetuating confusion should do the same.

MARPESSA Gray, 1821, or *COCHLODINA* Fér., 1821

Most modern authorities follow Lindholm [43] in employing the name *Cochlodina* Fér. instead of *Marpessa* Gray, for the group that includes *C. laminata* (Mont.). Both of these names appeared in print early in the year 1821, and there seems to be some difference of opinion as to which appeared first. This question, however, is immaterial, because a study of Gray's article shows that in it the name *Marpessa* was not published in accordance with the conditions stipulated in Article 25 of the Rules.

The name appears only once in a list on the last page of Gray's paper.[44] The list is headed :—

> " The following are New British species of Mollusca : "

and begins with :—

> " Sepia Calamara sagittata monro fishes.
> Limag Arion hortensis ferusac."

Then come twelve more species, most of them Draparnaud's, with brief references to his figures. Next follow :—

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[41] *Trondhiemske Selskabs Skrifter*, vol. iii, 1765, pp. 436 and 437, pl. vi, fig. xvii.
[42] *Journ. of Conch.*, vol. xvii, 1925, pp. 267–9.
[43] *Proc. Malac. Soc.*, vol. xvi, 1925, pp. 261 and 262.
[44] *London Medical Repository*, vol. xv, March, 1821, p. 239.

"Clauselia Iphigena Rolphii, undescribed. Kent.
——— Marpessa bidens hyalina.
Nerita Syncera Hepatica, N.S. . . ." and so on.

It will be noticed that the name *Marpessa* appears without any definition or description, or any bibliographical reference or other adequate indication of what Gray intended his *Marpessa* to comprise. The name *bidens* had already been given to three species now placed in three different genera of the Clausiliidæ. Müller's *C. bidens* and Montagu's *C. bidens*, however, had both been known to inhabit Britain since the days of Martin Lister. It might therefore be argued that Gray could scarcely have considered them to be new British species and that it was more likely that he meant Linné's *C. bidens*, a South European form that a few years previously had been reported to occur in Dorsetshire. Or possibly it might be thought that he had come across some albino specimens of either *C. bidens* Müller or *C. bidens* Montagu, and had erroneously considered that they might rank as a new British species which he had therefore called "*bidens hyalina*". It is only by studying his later papers that we are able to judge to what group he afterwards thought he had intended his name *Marpessa* to be applied. From these facts it seems clear that the publication of this name in 1821 did not comply with Article 25 (*a*).[45] And it seems doubtful whether it even complied with Article 25 (*b*), for to call a new British species "Clauselia Marpessa bidens hyalina", without even putting the word "Marpessa" in parenthesis as required by Article 10, is scarcely to apply the principles of binary nomenclature. Thus the name *Marpessa* does not appear to have been validly published in 1821 in Gray's paper, and therefore most modern authorities would seem fully justified in preferring to use de Férussac's name *Cochlodina* instead, for there can be no doubt that the publication of this name conformed to Article 25, and, like *Cochlicopa* Fér., it was not simply proposed as a substitute for an older name (see pp. 30 and 31).

TESTACELLA HALIOTOIDES Lam. or T. MAUGEI Fér.

Several years ago I endeavoured to show that those authors were undoubtedly right who regarded the name *Testacella haliotoides* Lam., 1801, as a *nomen nudum* and therefore invalid, and employed de Férussac's name, *T. maugei*, instead.[46] In his well known work [47] it was customary for Lamarck to mention a single species as an example of each genus at the end of his generic description, and after describing the genus *Testacella* he gives as an example of it the species "*Testacella haliotoides* n. *ex. D. Mauger*, *ex ins. Teneriffæ*". But he gives no description or figure of this species, and we only infer that it was probably *T. maugei* Fér. because this is the only species known from Teneriffe. Opinion 52, however, makes it quite clear that when there is no specific description the mere "citation of the type locality of a species is not sufficient to establish a name".

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[45] See also the latter part of Opinion 97.
[46] *Naturalist*, 1921, pp. 401–3.
[47] "*Système des Animaux sans Vertèbres*," 1801, p. 96.

But the author of this List considers that according to Opinion 43 the description of the genus covers that of the species and renders the specific name valid, and he adds that a separate description of the species would be simply a repetition of the generic description, almost as if he thought that the distinctive characters of individual species were the same as those that distinguish a genus as a whole. Opinion 43, however, does not appear to apply to cases of this kind, but to those in which a new genus is established for a single species. When an author considers that a new species which he has discovered is so different from any other known form that he cannot fit it into any genus that has been already established, he frequently proposes a new genus for this new species and, instead of troubling to discriminate between the generic and specific characters of the new form, he sometimes writes only a single description of it. Opinion 43 deprecates this practice, but states that when it has been followed a single description is sufficient to render valid both the new generic and the new specific name. Lamarck, however, did not establish the genus *Testacella* for only one species, but for all the slugs then known that had an obliquely conical subspiral shell near the hinder end of the back. This is proved by the fact that in his generic description he cites the " Limaces à coquilles ", figured by Favanne, as illustrative of the genus. In my previous paper I showed that Favanne's forms were different from the one from Teneriffe, and the author of this List agrees that Lamarck did not cite these forms as synonymous with his *T. haliotoides*. Thus the genus *Testacella* was established originally for more than one species, and it therefore cannot be reasonably maintained that the generic description is equivalent to a specific description of any one of them, as obviously it would apply equally to all the species included in the genus. Accordingly the name *T. haliotoides* remained a *nomen nudum*, a fact that has recently been emphasized by Connolly,[48] and we should continue to use the name *T. maugei* Fér. instead.

TESTACELLA EUROPŒA Roissy, 1805, or *T. HALIOTIDEA* Drap., 1801

No attempt is made to excuse the use of the name *Testacella europœa* Roissy in the place of the older name *Testacella haliotidea* Drap., which seems to be a clear breach of the Law of Priority, for it is not disputed that Draparnaud gave a sufficient description of his species and that it is the one that has nearly always been known by his name. And as I showed in my previous paper[49] even if the name *T. haliotoides* Lam. had not been a *nomen nudum*, Draparnaud's name could still not be rejected as a homonym by those who wish to follow the International Code. This is made quite clear under Article 36, where it is stated that if names already introduced differ " only in termination or in a slight variation in spelling . . . they are not to be rejected on this account ". And among examples of specific names that would still both be available, even if given to species belonging to the same genus, the Article mentions

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[48] *Annals S. African Museum*, vol. xxxiii, 1939, pp. 117 and 118.

[49] Op. cit. (1921), pp. 403 and 404.

" *rhopalocephala* " and " *rhopaliocephala* ". Surely no one could maintain that " *haliotoides* " and " *haliotidea* " differ less from each other than do these two names. It therefore seems quite clear that if we want to follow the International Rules we must retain the name *T. haliotidea* for the species that has been known by this name for generations.

Gonyodiscus Fitz. or *Discus* Fitz.

Thiele, Pilsbry, and others use the name *Discus* in preference to *Gonyodiscus* for the genus that includes *D. ruderatus* (Hartm.) and *D. rotundatus* (Müll.) ; and H. B. Baker[50] has shown that if we wish to follow the Rules the shorter name should be employed, assuming that H. and A. Adams were the first revisers to subordinate one name to the other. Baker bases his arguments on Opinion 40, but the point seems quite clear from Article 28 itself ; for this Article states that when a genus is formed by the union of two or more genera " if the names are of the same date that selected by the first reviser shall stand ".

It is difficult to take seriously Kennard and Woodward's suggestion that *Discus* was a printer's error for *Gonyodiscus*, notwithstanding that Fitzinger uses the former generic name for four species and the latter for only one.[51] These authors seem to have overlooked the fact that Fitzinger,[52] in framing his somewhat artificial classification, evidently regarded the presence or absence of a sharp keel encircling the shell as of generic importance both in this group and in the Planorbidæ. For the four species for which he used the name *Discus* have small depressed umbilicate shells without any sharp peripheral angle, whereas *D. perspectivus* (Megerle v. Mühlfeldt), the species that he placed in *Gonyodiscus*, differs from them in possessing a sharp keel. Hence the name that he proposed. For in view of the frequent confusion between the letters *i* and *y* throughout Fitzinger's paper it is practically certain that " *Gonyodiscus* " was a mistake for " *Goniodiscus* ", and that the first half of this word was derived from γωνία an angle ; although it is just conceivable that it might have been derived from γόνυ a knee, in allusion to the angular side of the shell, when seen in profile, having some resemblance to the outline of a bent knee.

The name *Gonyodiscus* or *Goniodiscus* is still available, however, for the section or subgenus of which *D. perspectivus* is the type species, *D. ruderatus* (Stüd.) being the type of *Discus* itself. Thiele rightly places the latter group first,[53] and seeing that *D. rotundatus* (Müll.) is certainly nearer *D. perspectivus* (Megerle v. Mühlfeldt) than *D. ruderatus* (Hartm.) is, it seems clear that *D. ruderatus* should be placed before *D. rotundatus*, and not after it, as in this List.

THE CLASSIFICATION OF THE ZONITIDÆ

Among the various classifications of the Zonitidæ that different authors have used probably the most natural and the most convenient for a List of British snails is that which divides the family into three subfamilies, namely (1) the Euconulinæ, (2) the Zonitinæ, and (3) the Gastrodontinæ.

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[50] *The Nautilus*, vol. xlv, 1932, p. 85.
[51] *Proc. Malac. Soc.*, vol. xiv, 1920, p. 85.
[52] *Beiträge z. Landeskunde Oesterreich's u. d. Enns*, vol. iii, 1833, pp. 88–122.
[53] *Handbuch der Systemat. Weichtierkunde,*" vol. i (pt. 2), 1931, p. 578.

The Euconulinæ is represented in the British Isles only by *Euconulus fulvus* (Müll.). It is probably the most primitive subfamily and is in some ways intermediate between the Zonitidæ and the Helicarionidæ (or Ariophantidæ) in which some authors include it, notwithstanding that this family is practically confined to the Tropics and the Southern Hemisphere. On the other hand, the Gastrodontinæ is a more specialized group, found mainly on the Continent of North America and in Bermuda, but represented in the British fauna by *Z. excavatus* (Alder) and *Z. nitidus* (Müll.). The remaining genera, *Vitrea* Fitz., *Oxychilus* Fitz., and *Retinella* Shuttleworth in Fischer, though very distinct from one another, may all be included in the subfamily Zonitinæ.

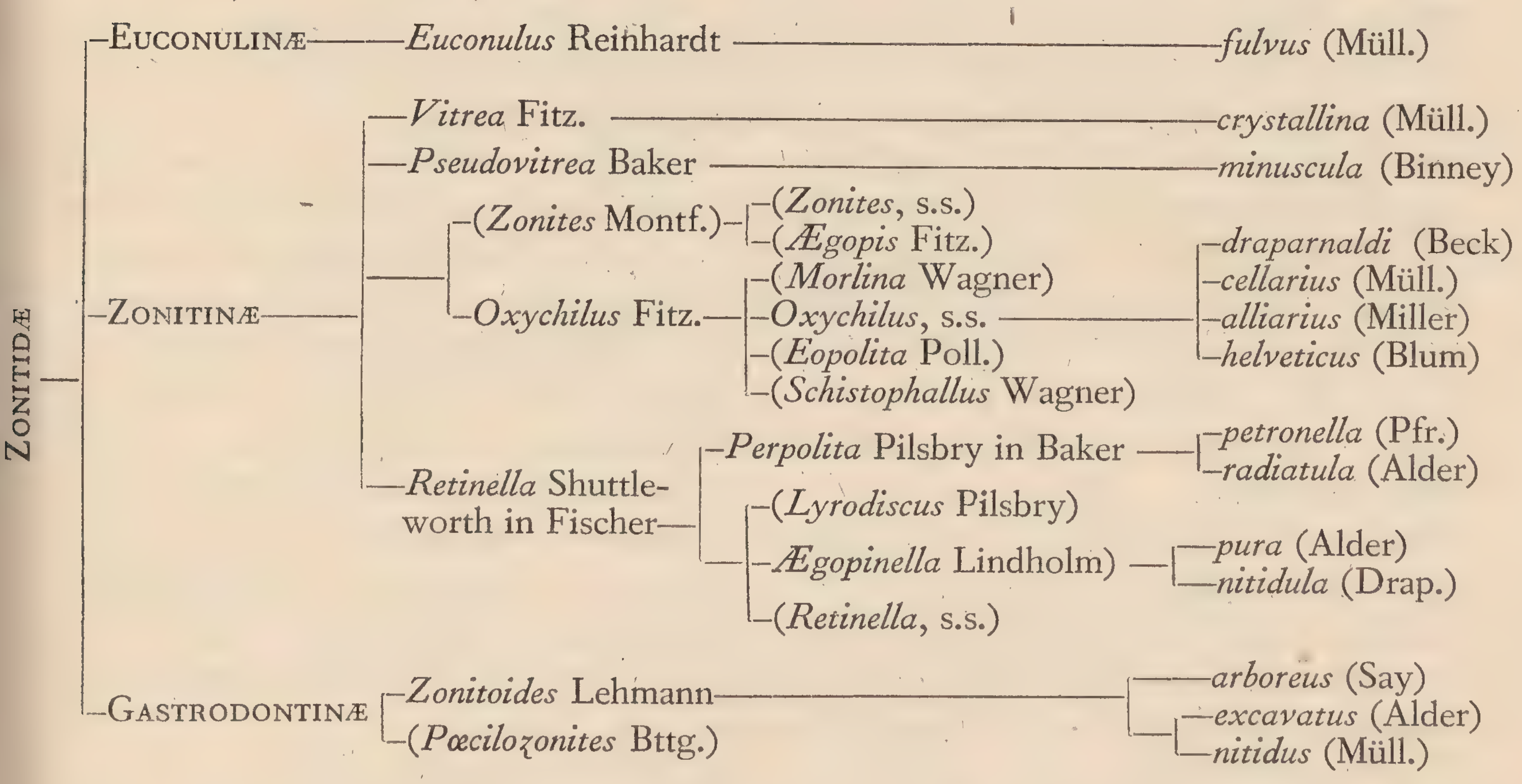
While our species of *Oxychilus* are all closely related to one another, those of *Retinella* belong to two very different subgenera, namely *Perpolita* Pilsbry in Baker, which includes *R. radiatula* (Alder) and *R. petronella* (Pfr.), the latter possibly extinct in Britain, and *Ægopinella* Lindholm, to which *R. pura* (Alder) and *R. nitidula* (Drap.) belong. *Ægopinella*, like *Retinella*, s.s., appears to be endemic to the western part of the Palæarctic Region. On the other hand *Perpolita* is well represented in North America, and in my opinion it is probably less nearly related to the European groups, *Retinella*, s.s., and *Ægopinella*, than to the American genus *Glyphyalinia* v. Mts., with which it is connected through *Glyphyalus* and *Glyphyalops*.[54] If therefore we were to follow those authors who regard *Glyphyalinia* and *Retinella* as distinct genera, I am inclined to think that *R. radiatula* (Alder) and *R. petronella* (Pfr.) should be assigned to the former genus rather than to the latter. But these two groups are undoubtedly very closely related to each other and to the American genus *Mesomphix*, including *Omphalina*, and much might be said in favour of uniting all of them into a single genus.

Of the British species of *Retinella*, *R. nitidula* (Drap.) is the most highly specialized and should therefore come last, the order in this List being reversed. In the present state of our knowledge, however, the author has probably been well advised not to include *R. nitens* as another British species. This name has been commonly applied on the Continent to at least three species differing rather widely in their anatomy but very little in their shells. One of these, however, seems to be so similar anatomically to *R. nitidula* (Drap.) that not improbably it is merely a variety of that species, and at present this is the only one that is known to inhabit the British Isles. But it is quite possible that one of the other two species may also occur in Britain, and I should be interested to examine any doubtful specimens of *Retinella* that collectors may like to send to me alive or in spirit.

---

[54] For information about these groups see H. B. Baker: *Proc. Acad. Nat. Sciences Philadelphia*, vol. lxxx, 1928, pp. 14–23, pls. 3 and 4; vol. lxxxii, 1930, pp. 193–219, pls. 9–14. Baker has recently expressed the opinion that *Perpolita* is not more than sectionally distinct from the subgenus *Nesovitrea* Cooke, 1921, found in the Hawaiian Islands, the name of which has seven years' priority (*B.P. Bishop Museum Bulletin*, 166, 1941, p. 328); but according to Cooke's description and figures of the type species of *Nesovitrea* (*Occ. Papers B.P. Bishop Museum*, vol. vii, 1921, pp. 271–3) the differences in the animal that separate it from *Perpolita* are not quite so few as Baker seems to imply.

Perhaps the probable mutual relations of the British members of this family may be more easily understood from the following table, in which I have included all the species known to occur in the British Isles, both native and introduced. And as their true affinities are not at all widely known I have also included in brackets the names of some related genera and subgenera, which are known to me anatomically, and also occur in the western half of the Palæarctic Region and on some of the islands in the Atlantic Ocean. But I have omitted the purely Nearctic groups, of which the anatomy and affinities have already been so ably expounded by H. B. Baker and other American zoologists.[55]



GENDER OF *OXYCHILUS* FITZ.

This author treats the name *Oxychilus* Fitz. as if it were of the neuter gender; but Fitzinger himself undoubtedly regarded it as masculine, for in the two cases in which he combined an adjective with this name he wrote *Oxychilus lucidus* and *Oxychilus nitidulus*.[56] In treating the name as masculine Fitzinger appears to have correctly followed the classical usage. When an adjective like ὀξύς sharp, is combined with a substantive like χεῖλος a lip, in classical usage we expect the resultant word to be an adjective and not a substantive—in this case it would be *Oxychilus -a -um* when turned into Latin. And of course the masculine form of this adjective might be used as a substantive. The name would then mean the "sharp lipped one", and not simply "the sharp lip", as it would have done had it been neuter.

Modern authors often depart from classical usage in matters of this kind, but as Fitzinger did not do so there seems to be no justification for this change. For although none of the Rules deals particularly with the gender of generic names, those dealing with their spelling, typification, etc., make it very clear that in all such cases what we find in the original publication must be followed, unless it quite evidently contains a slip of the pen, misprint, or similar mistake, and that unauthorized changes introduced by later writers should not be accepted.

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[55] References to the principal articles on the American Zonitidæ are given by Baker in *Occasional Papers of the Museum of Zoology, University of Michigan*, no. 629, 1933, especially on p. 14.

[56] Op. cit., p. 100.

OXYCHILUS ROGERSI (B. B. Woodward) and O. HELVETICUS (Blum)

In 1908 I visited the type locality of *O. helveticus* (Blum)—Weissenstein, Solothurn, on the Swiss side of the Jura Mountains—and found there a number of specimens of the form that Swiss and German authorities agree is Blum's species, which is easily distinguished from the very few other species of *Oxychilus* that occur in that part of Switzerland. These shells I carefully compared with English specimens, mainly from Cambridgeshire, of what we have been accustomed to call *O. helveticus* and found them to be quite identical. Moreover, at the time when the Rev. E. W. Bowell still thought that the radula of *O. rogersi* differed from that of the true *O. helveticus*, I sent to him a radula extracted from a specimen from Paxton Hill, St. Neots, Huntingdonshire, and he returned it to me labelled: " I think this specimen is genuine helvetica Blum.—E. W. B." I therefore feel quite convinced that the true *O. helveticus* (Blum) occurs in England, and that this name should not be omitted from the List. This conclusion is not affected by the fact that some Continental collectors have confused Blum's species with other forms such as *O. subglaber* (Bgt.), which is merely a variety of *O. draparnaldi* (Beck), or *O. alliarius* (Miller), a species that is found chiefly in Northern Europe and does not seem to occur in Switzerland, but has been much misunderstood by French conchologists.

It is conceivable that the true *O. rogersi* (B. B. Woodward) may be another species that also occurs in England, but if so it must be a very scarce one which I have not had an opportunity of dissecting. Woodward's original figures,[57] however, closely resemble immature examples of *O. helveticus* (Blum); and assuming that the specimens on which he founded his species were adult, it seems possible that in the locality where they were found the shell did not become quite as fully developed as it does in many other places, but retained more of its juvenile characters than usual.

It is remarkable that in the genus *Oxychilus* new species have been proposed on the basis of quite small differences in the shell or the radula, which would scarcely have been regarded as of varietal importance in other genera, such as *Helicella*. I am glad to see, however, that Kennard's supposed species, *O. hibernicus* and *O. scharffi*, have been entirely omitted from this List as they seem to be only varieties of *O. cellarius* (Müll.).

SUBGENERA OF *VITRINA*

It may be worth emphasizing that our three species of *Vitrina* belong to three very distinct subgenera, namely *Vitrina*, s.s., of which the type is *V. pellucida* (Müll.) (see Opinion 119); *Phenacolimax* Stabile, of which Fischer designated *V. major* (Fér.) as the type species; and *Semilimax* Gray, of which the type is *V. semilimax* (Fér.). So much do these subgenera differ in their anatomy that Hesse regarded them as distinct genera, though unfortunately he applied the wrong names to them.[58] H. B. Baker, however, has elucidated their nomenclature.[59]

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[57] *Journ. of Conch.*, vol. x, 1903, pl. vi, figs. 11–13.

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[58] *Archiv für Molluskenkunde*, vol. lv, 1923, pp. 1–25, 81–115, 130–145, pls. i and ii.

[59] *The Nautilus*, vol. xlii, 1929, pp. 137–9.

(*To be concluded*)

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN AND IRELAND.

667th Meeting, held in the rooms of the Royal Society, London, 14th February, 1942.

Mr. A. E. Ellis, Vice-President, in the chair.

Present: (Members) Colonel Bensley, Messrs. Blok, Salisbury, Winckworth, Dr. Hopwood, Lieut.-Col. Peile, Dr. Kathleen White. (Visitors) Dr. L. R. Cox, Mr. Stoner, and Miss Eales.

Members Elected.

Browston Bussey and L. W. Stratton.

The President's Address, "Land Snails and Slugs of West Glamorgan," was read in abstract.

Other papers read in title: "Mollusca of Leyburn and District," by R. M. Lowe, and "Freshwater Snails at Droylsden in 1941", by F. Taylor.

A statement of the accounts was presented by the Hon. Treasurer.

A vote of thanks to the President was passed.

668th Meeting (Annual), held in the rooms of the Linnean Society, London, 27th February, 1943.

Mr. A. S. Kennard, Vice-President, in the chair.

Present: (Members) Messrs. Gardiner, Ellis, Wrigley, Blok, Moses, Salisbury, Winckworth, Davey, Biggs, Wilkins, Dr. Kathleen White, Dr. Hopwood, Lieut.-Col. Peile, and Colonel Bensley. (Visitor) Mrs. Davey.

Annual Reports.

The annual report of the Council, the reports of the Yorkshire and North Staffordshire branches, and the report of the Recorder for Marine Mollusca, were presented and adopted.

The Hon. Treasurer presented a report on the financial position of the Society.

The Officers, Council and Auditors last in office were re-elected.

Members Elected.

F. St. J. Brougham, C. D. Heginbothom, and C. J. C. Siggers.

Annual Report.

This is the Sixty-sixth Annual Report of the Society. Since the last Annual Meeting the Society has lost three members by death, namely Charles Oldham, Hugh C. Fulton and Miss J. D. Robertson. Three new members have joined the Society.

It has again not been possible to hold the usual monthly meetings at the

Manchester Museum, but it is hoped to arrange one or more during 1943. One ordinary meeting was held in London on the 14th February, 1942.

Since the last Annual Meeting held in London on the 14th November, 1941, three numbers of the *Journal* have been issued.

Additions to the Library have been received from Mr. A. S. Kennard, Dr. P. Bartsch, Dr. J. W. Jackson, and Professor G. D. Hale Carpenter.

The Recorder of Non-Marine Mollusca is now serving with the Forces and has been unable to provide his usual report. The Record Books are now in the hands of the Hon. Secretary; they show several new records or verifications, mainly in *Succinea* and *Carychium*.

The Council is pleased to note that the Malacological Society of London celebrates its Fiftieth Anniversary this year and the following address will be presented at its Jubilee Meeting.

27th February, 1943.

To the President, Council, and Members of the Malacological Society of London. Greetings.

On this occasion of the Fiftieth Anniversary of the foundation of your Society, We, the President and Secretary of the Conchological Society of Great Britain and Ireland, do on behalf of the said Society offer felicitous congratulations on the Jubilee of the Malacological Society of London, and we trust and pray that the good work of its members may long continue and flourish as in the past and as evidenced in the published Proceedings of the Society.

For and on behalf of the Conchological Society of Great Britain and Ireland.

(Signed) H. E. QUICK, *President*.
J. WILFRID JACKSON, *Hon. Secretary*.

669th Meeting, held at the Manchester Museum, 10th April, 1943.

Mr. G. C. Spence, Vice-President, in the chair.

New Member Elected.

B. Verdcourt, 86 Claremont Road, Luton, Beds.

Members Deceased.

H. W. Worsfold and Hugh McClelland.

Members Resigned.

Mrs. Alice Anderson, Thos. Edwards, Boston Society of Natural History, and Perthshire Society of Natural Science.

Papers Read.

"The Lyons Collection in the Tenby Museum," by A. S. Kennard.
"*Ashfordia granulata* in Co. Dublin," by A. Comfort.
"Note on *Urocoptis dubia* Chitty," by G. C. Spence.

Exhibits

By Mr. J. E. Cooper: *Oxychilus draparnaldi* (Beck) from Herne Bay, East Kent—a new vice-county record.

By Mr. A. Comfort: *Tricla* (= *Scaphander*) *lignaria* (L.) from the beach at Dollymount Golf Links, Dublin Bay.

By Mr. G. C. Spence: *Ancylus* sp. from Mount Kenia, 6,000 ft., and *Dreissena ornata* Morelet from Banana Creek, mouth of the Congo River, Belgian Congo.

By Mr. C. H. Moore: *Obba* spp. and *Murex* spp., also a subscalariform specimen of *Camaena cicatricosa* Müller.

By Mr. F. Taylor: A remarkably fine series of *Lymnaea stagnalis* (L.) and *L. peregra* (Müll.), showing abnormal growths, from the canal at Droylsden, Lancashire. (See full description in North Western Naturalist, vol. xvii, p. 391); *Lymnaea auricularia* (L.) from the canal at Bardsley, Lancashire; and *Physa rivalis* (Turton) (= *heterostropha* Say) from many localities round Oldham.

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HUGH McCLELLAND

(9th July, 1864—14th March, 1943).

By H. OVERTON.

WHEN I first knew Hugh McClelland he was keenly interested in Natural History generally and was engaged in forming a collection of British beetles which soon faded out after my talks with him on mollusca a few years before the close of the last century. From then onwards his whole leisure was centred on shells. He was purely a collector, and an omnivorous one, of land, freshwater, and marine shells, firstly British and later foreign, but he finally had a decided leaning towards foreign marine. He amassed a large world-wide collection which he disposed of by sale some few years before his death (about 1935) together with his conchological library, which was fairly extensive. He personally collected a large quantity of land, freshwater, and marine specimens during his business visits to Canada and South Africa. He was elected a Member of the Midland Malacological Society on 13th December, 1901, which Society was founded in 1898, and was amalgamated with the Birmingham Natural History and Philosophical Society in 1906, continuing his membership until his decease. He became a member of the Conchological Society in 1903, and of the Malacological Society in 1913.

As far as I am aware his only contribution in the way of literature was the compilation of a General Index of *The Conchologist*, vols. 1 and 2, and its continuation as the *Journal of Malacology*, vols. 3–12, the *Journal of Conchology*, vols. 1–16, and the *Proceedings of the Malacological Society*, vols. 1–15, which he published at his own expense in 1926, presenting a copy to all members of the Society. At the time of his decease he was engaged in bringing this useful work up to date, and I understand that all his notes and papers in connection therewith are now in the hands of Mr. J. R. le B. Tomlin who, I sincerely hope, will find time to complete and publish it in the near future.

He was a merchant trading under the name of McClelland Brothers, in Cambridge Street, Birmingham, of which business he had been the sole owner for many years until his retirement in 1938. On 1st June, 1892, he married Miss Florence Annie Martindale, who predeceased him on 13th November, 1940. He leaves two sons and one daughter.

NEW SPECIES OF *CHARITODORON*.

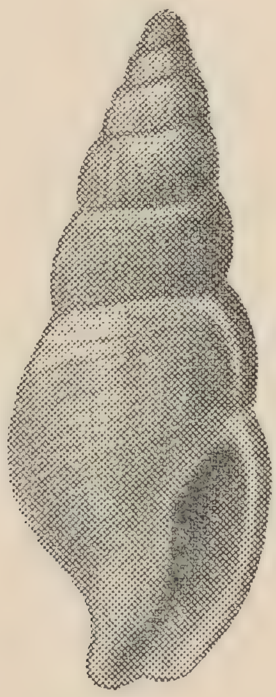
By J. R. le B. Tomlin.

Charitodoron pasithea [1] n. sp.

This, the fourth species of the genus, still bears out the superficial likeness to *Colus*, and resembles *Ch. thalia* in size and general appearance. The shell is, however, more solid, has strongly channelled sutures and much more pronounced sculpture.

The shell is rather solid, cream-coloured, with about seven whorls; protoconch eroded; sculptured with deep, regular, cleanly cut spiral grooves which are narrower than the intermediate ribs, and of which there are eight on the penultimate whorl; slight arcuate longitudinals appear fairly constantly on the upper whorls, but are hardly traceable on the body whorl; occasionally a linear rib is interpolated in one of the grooves, especially at the top of a whorl; aperture and canal much as in the other species of the genus.

Long.: 21 mm.; diam., max., 8 mm. Aperture: long., 9 mm.; lat. 3·5 mm. Hab.: Off Cape Point in 430–630 fathoms (S.A. Mus., no. A 3434).



Several examples were dredged, showing practically no variation, all mended in one way or another; the apparent varix on the penultimate whorl in the figure is due to a breakage.

The most characteristic feature, perhaps, is the depth of the spiral grooves, compared with which those of the other species are superficial and shallow.

---

[1] Homeric name for one of the Graces.

OCCURRENCE OF *ASHFORDIA GRANULATA* (ALDER) IN CO. DUBLIN.

By A. Comfort.

(*Read before the Society*, 10*th April*, 1943.)

The old records of *Ashfordia granulata* (Alder) in co. Dublin have not, until now, been supported by recent collecting. There are a good many likely places along the two canals running west from the city, but these are found mainly to yield *T. hispida*. *A. granulata* is absent from the Wicklow Glens, such as that of the Cookstown River at Enniskerry, although the other woodland forms which Phillips mentions as its associates in Limerick—such as *Acanthinula lamellata*, *Pupa anglica*, and *Hygromia subrufescens*—are present, and the terrain looks suitable.

I was fortunate enough to find dead shells of the species in February of this year at Glasnevin Botanical Gardens, in the clumps of ferns beside the River Tolka. The river at this point has been artificially boarded in, and on the botanic side it is overhung by a good deal of wild and artificially planted vegetation, small willows, ferns (*Aspidium*), *Lathraea*, and some ornamental grasses. Among these, and under the dead leaves, the following species occurred :—

**Ashfordia granulata* (Alder)
**Trichia striolata* (Müll.)
Trichia hispida L.
Limax spp.
Hyalinia crystallina (Müll.)
Oxychilus lucidum (Drap.)
O. cellarium var. *hibernica* Kennard
Goniodiscus rotundatus (Müll.)
Cochlicopa lubrica (Müll.)
Carychium minimum (Müll.)
**Succinea pfeifferi* Rssm.
**Testacella maugei* Fér.

* Dead shells only.

The association with grown and half-grown *T. hispida* was noticeable, and rather unlike the usual behaviour of the species. In view of the presence of *Subulina octona*, *Oxychilus lucidum*, and *Pleurodiscus flavidus* in these same gardens the presumption was against the shells of *A. granulata* being native : the opposite bank, which is well grown with wild plants, is inaccessible.

However, in a few days I had the opportunity of looking for *A. granulata* higher up the Tolka, in the region of Cabra station, about 1½ miles above the gardens. The stream here is considerably narrower, running between undermined banks of clay in wet meadows where there has been a minimum of interference. The dead shells, mostly full-grown, are present in flood débris (stalks of *Phragmites*) in considerable numbers, together with typical native species, *T. hispida*, *G. rotundatus*, *C. lubrica*, and *B. tentaculata*. A good many shells contained dipterous pupae. The hedges above the stream are too dry for *Ashfordia*, and contain *C. barbara*, while the banks at this point are nearly bare and show signs of recent flooding. The shells seemed to have come from considerably higher up stream. Mr. A. W. Stelfox, who very kindly authenticated the specimens, suggested that an autumn sweeping expedition in the gullies leading down to the upper Tolka would probably produce living examples, since the animals breed and die at the end of the autumn, and the recently hatched shells would be too immature in February to be easily identified.

The present find extends the range of *Ashfordia* in Ireland to eight of the forty areas in the Irish list, the others being Sligo, Clare, North and South Kerry, Limerick (common in rejectamenta of the Shannon and as a woodland form), and East and West Cork. It seems possible that a fresh hunt might revive the old Kildare localities and indicate a south-western and south-eastern peripheral distribution from Clare to Dublin.

I owe my very sincerest thanks to Stelfox for much help and hospitable advice while collecting round Dublin.

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THOMPSON, W. *Cat. L. and F. W. Moll. of Ireland*, p. 12, 1840.

EDITORIAL NOTE.

THE publication of a new magazine devoted to the mollusca is such an unusual event that we regret to have been unable to chronicle it before.

The first number of *Johnsonia* appeared on 25th October, 1941 : it is published by the Department of Mollusks, Museum of Comparative Zoology, Harvard, and is intended to monograph the marine shells of the Western Atlantic. It is intended to publish 100 pages per annum for a subscription of $3·00. What we have seen so far is admirably printed and illustrated with photographs which are mostly life size. The name selected as the title of the new magazine is a tribute to the late Charles W. Johnson, the well-known conchologist of Boston, Mass. Deep-water species, i.e. from a depth of over 25 fathoms, will not be fully treated but listed with the original reference.

NOTES ON A LIST OF THE BRITISH NON-MARINE MOLLUSCA.

By HUGH WATSON, M.A.

(*Concluded from p. 47.*)

ARIONIDÆ.

MOST malacologists, I think, will agree that in his classification of the families and genera which he placed in the stirpes Zonitacea and Ariophantacea Thiele was less successful than usual, and seeing how often the author of the List we are considering departs from Thiele's arrangement it is a pity that he adhered to it in placing the Arionidæ between the Vitrinidæ and Limacidæ. It is probable that the last named family is much more nearly related to the Vitrinidæ than is the Arionidæ, which is usually believed to have been independently evolved from the Endodontidæ or their allies. It would seem better, therefore, to place the family Arionidæ immediately after the Endodontidæ rather than to intercalate it among the Oxygnathous families, though, alternatively, it might perhaps be placed after the latter.

SPECIES OF *ARION.*

The five species of *Arion* recognized in this List are now each placed in a separate section, but the differences between these sections seem to be quite small and the omission of their names from the List is less to be regretted than the omission of those of the much more important subgenera of *Vitrina* and *Limax*. But seeing that the general arrangement in this List is to proceed from the more primitive to the more advanced forms, it would have been better to place the species in the reverse sequence. In my opinion to place *A. ater* (Lin.) first instead of last among our species of *Arion* would only have been correct if the author had been arranging the forms in descending order, and had placed the Ellobiidæ, for example, at the end of the Pulmonata instead of at the beginning and the Neritidæ last among the Gastropoda.

The valuable researches of Gerhardt on the mating of various slugs have, however, clearly demonstrated that we have more species of *Arion* in the British Isles than has been supposed, and that those authors were right who have regarded what we still usually term *A. ater* as a mixture of two or three species.[1] The form which is probably the true *A. ater* (Lin.) certainly occurs in Cambridgeshire and Sussex, and is probably widely distributed over the whole of the British Isles ; but the form which most Continental authorities have called *A. empiricorum* (Fér.), and which Gerhardt has shown to be undoubtedly a distinct species, is probably also widely spread in this country, especially in the south of Great Britain and Ireland, and specimens collected by Quick in Glamorgan appear to belong to it. It is very unlikely, however, that the oldest name for this species is *A. empiricorum* (Fér.). Perhaps those authors are right who call it *A. rufus* (Lin.), but this question seems to be still unsettled.

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[1] *Zeitschrift f. Morphol. u. Ökol. d. Tiere*, vol. xxxvi, 1940, pp. 571–8 and 580.

Colour alone is an uncertain guide in the genus *Arion*, and this species may be orange, red, or brown, or it may be quite black.

Gerhardt has also shown that Portuguese slugs, which he thinks are *A. lusitanicus* Mabille, belong to a third distinct species; and if the British specimens that Collinge identified as *A. lusitanicus* belong to the same species, then we have another one to be added to the British List, though probably this last form is scarcer and may be confined to the south-west. This form, however, if it occurs, should be placed before the other two, between them and *A. subfuscus* (Drap.), with which it also has some affinities.

SUBGENERA OF *LIMAX*.

Our native species of *Limax* belong to four distinct subgenera, namely (1) *Malacolimax* Malm, 1868 (*L. tenellus*); (2) *Limax* Lin., s.s. (*L. maximus* and *L. cinereo-niger*); (3) *Limacus* Lehmann, 1864 (*L. flavus*); and (4) *Lehmannia* Heyn., 1862 (*L. arborum*). Recent researches have shown that these subgenera all differ rather widely from one another; indeed the last one, *Lehmannia*, is very usually regarded as a distinct genus on the Continent; but it seems to me that it is linked with the remaining subgenera by two others that occur in the western half of the Mediterranean Region, both of which have been introduced into Great Britain. One of them, *Ambigolimax* Poll., 1887, is represented by a species that Quick has found to have become established in greenhouses at Swansea; the other by a species which Waterston has found to be not uncommon in the Botanic Gardens at Edinburgh; but as I understand that he is himself compiling a paper on this interesting slug I must not encroach upon his labours nor anticipate what he may have to say.

SPECIES OF *AGRIOLIMAX*.

Only two species of *Agriolimax* are included in this List, although it is now known that four occur in the British Isles.

First we have the true *A. agrestis* of Linné, found by Ellis in East Norfolk,[2] and probably occurring also in other parts of Great Britain. It should be especially sought for in damp uncultivated spots, but is not always easy to distinguish in the field from the uniformly pale variety of *A. reticulatus* (Müll.).

This second species, which was clearly differentiated from *A. agrestis* by Luther in 1915,[3] varies greatly in colour, and is the commonest and most widely distributed slug in the British Isles. Yet its name is entirely omitted from the List we are considering.

Thirdly, we have the very distinct species that was discovered by Oldham some years ago in Cornwall, where it seems to be not uncommon, and has since been found in a few other counties in England, Scotland, and Wales. Specimens from Swansea were exhibited by Quick before the Malacological Society,[4] and Blackburn has recorded its occurrence at Darlington,[5] while Gerhardt has described and discussed its mating habits, etc.[6] Among the numerous species of *Agriolimax* that have been described—usually very inadequately—this form is shown by its anatomy to be related to a group of species that live in the Mediterranean Region and include *A. panormitanus* L. and P. (1882) from Sicily, which Taylor erroneously thought was a dark variety of *A. agrestis*, and *A. caruanæ* Poll. (1891) from Malta, which appears to be so similar to our British form that it may be conspecific with it, a view with which Dr. A. Wagner, of Budapest, agrees. But it is impossible to be sure of this without having seen any examples of the Maltese slug, and so far my repeated efforts to obtain some have all failed. British specimens of this species are usually greyish brown, with a lighter brown mantle, and faintly spotted ; and are intermediate in size, as well as in colour, between *A. reticulatus* (Müll.) and *A. lævis* (Müll.). They resemble the latter species in their clear slime and active movements, but are generally found in gardens and cultivated places instead of in marshes. I should welcome the opportunity of seeing any specimens of *A. caruanæ* from Malta, or any British examples either of this form or of the true *A. agrestis* (Lin.).

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[2] *Journ. of Conch.*, vol. xxi, 1941, p. 238.

[3] *Acta Soc. pro Fauna et Flora Fennica*, vol. xl, no. 2, pp. 1–42.

[4] *Proc. Malac. Soc.*, vol. xx, 1933, p. 230.

Fourthly, we have the well-known species commonly called *A. lævis* (Müll.), of which I need say little except that on the Continent two species seem to have been confused under this name and it is not quite certain whether the one that is widely distributed in the British Isles is the true *A. lævis* of Müller, although it probably is. The figures of the genital organs in Taylor's Monograph are copied from Continental authors' drawings of the genital organs of the other species and therefore do not resemble those of our British form.

In his Introduction the author of this List states that the genotype has been given in each case, but it is omitted both in the present genus and in *Helicodonta*. I am glad, however, that he does not follow those modern authors who prefer to use the name *Deroceras* Raf. instead of *Agriolimax* (Mörch). Rafinesque proposed the name *Deroceras* in 1820 for a new subgenus of *Limax* found in America and characterized by the long tentacles arising from the back of the neck instead of from the usual place on the head. Needless to say *Agriolimax* does not possess this character. Apparently no slug has yet been found in America that does show this peculiar feature, and it has been thought that such a slug never existed and that Rafinesque based his new subgenus on a faulty description of a species of *Agriolimax* that occurs in that part of the United States in which *Deroceras* was supposed to have been found. But this appears to be a mere conjecture, and it seems to me that changes of familiar names should rest on something more substantial than a conjectural interpretation of what was probably a more or less imaginary animal. Until an American slug has been found showing the distinctive characters which Rafinesque said his slug possessed we might prefer to dismiss *Deroceras* as an apparently mythical creature, though like most mythical animals it may well have been based on an erroneous description or recollection of some existing form.

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[5] *Trans. Northern Naturalists' Union*, vol. i, 1934, p. 177.

[6] *Zeitschrift f. Morphol. u. Ökol. d. Tiere*, vol. xxxv, 1939, pp. 188–194.

PETASINA Beck or *EUCONULUS* Reinhardt.

The name *Petasina* Beck is now in common use for the section of *Trichia* that includes *H. edentula* Drap. and a few other related Helicidæ from Central Europe. To transfer this name to the very different genus usually known as *Euconulus* Reinhardt would be very confusing; and it would seem to be contrary to the International Rules, in view of the fact that Gude designated *H. edentula* Drap. as the type of *Petasina* Beck and therefore precluded this name from being used for any genus that does not contain Draparnaud's species.[7]

It is true that *H. fulva* Müll., the type of *Euconulus* Reinhardt, is also the type of *Petasia* Beck, a name which is pre-occupied; but it has already been shown that the contention that the name *Petasina* was proposed as a substitute for *Petasia* and must therefore take the same type is at variance with the facts, for when Beck introduced the name *Petasina* he did not say that it was a substitute for any other name.[8]

Equally fallacious is the argument that Herrmannsen in his well-known work selected *H. fulva* (Müll.) as the type of *Petasina* Beck. All that this author states is: "**Petasina** BECK 1847 Amtl. Ber. 24. Vers. d. Natf. p. 122. i. q. Petasia Beck."[9] This merely implies that Herrmannsen considered that *Petasina* was the same genus as *Petasia* or was synonymous therewith. But just as if an author had said that he deemed one species to be identical with another, this would not imply that these two species had the same type specimens, so also to have said that two genera were identical or were to be considered synonymous does not imply that the same species had been selected as the type of each. In any case it is clear that Herrmannsen did not expressly select a type of *Petasina* Beck, and according to Article 30 the expression "select the type" is to be rigidly construed.

I have already indicated that in my opinion this genus should not be so far removed from the Zonitidæ, but should either be placed next to that family, or be included in it, although in a separate subfamily from the other genera found in the British Isles.

CLASSIFICATION OF THE HELICIDÆ (AND FRUTICICOLIDÆ).

The author of this List divides the British Helicidæ into no fewer than sixteen genera, in addition to *Fruticicola* which he places in a separate family. And he attempts to justify his recognition of so many different genera by saying that the conclusions of anatomists have been accepted. To an anatomist like myself this statement seems strange.

In framing a natural classification of animals it is essential to take into consideration all their characters both internal and external. When this is done it is not surprising that in some cases, as, for example, *Monacha cantiana* (Mont.) and *Cochlicella acuta* (Müll.), the rest of the anatomy shows closer relationships than a study of the shells alone would have suggested, and that in other instances the reverse is the case. It is also true that certain anatomists resemble some conchologists in preferring to treat genera in the same way as Bourguignat used to treat species, splitting them up on what appeared to be very trivial and inadequate grounds. But no competent anatomist who was not badly infected with this passion for dismemberment would recognize so many genera as are separated in this List, even regarding as of generic importance the small differences that separate the groups containing *H. hispida* (Lin.) and *H. subvirescens* (Bellamy), for example, or *H. virgata* (da Costa) and *H. caperata* (Mont.).

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[7] *Proc. Malac. Soc.*, vol. ix, 1911, p. 362.

[8] Pilsbry: *Proc. Malac. Soc.*, vol. xv, 1922, p. 40. (See also Watson: *Journ. of Conch.*, vol. xvi, 1922, pp. 282 and 283.)

[9] "*Indicis Generum Malacozoorum*," Supplement, 1852, p. 103.

The anatomy of every one of our British Helicids has been examined and their natural relationships are known to be approximately as shown in the following table. For the sake of completeness I have included in this table introduced as well as native species, and also two species apparently extinct in Britain, *H. striata* (Müll.), found in our Pleistocene deposits, and *H. montivaga* (Westld.), from the Holocene, as both these species still live on the Continent and are known anatomically.

Different authorities will not agree about every detail of the relationships indicated in this table, but the differences of opinion will not be great if the evidence of all the organs is taken into consideration. For example, *H. lapicida* and *H. arbustorum* might be deemed to be even more intimately related than I have shown if we were to consider their genital organs alone ; but if we also have regard to the evidence of all the other organs, such as the radula, the shell, and the arterial system (ably elucidated by Poliński),[10] it will be realized that although these two forms are nearly related their affinities are not quite so intimate as the close resemblance of their genital ducts would suggest.

It is not in regard to the probable relationships of the different forms but to the way in which these can be best expressed in our conventional system of classification and nomenclature that there is most room for differences of opinion. Those who prefer to split up the Helicidæ into a multitude of small genera, many of which differ only slightly in their anatomy, tend to give generic rank even to the minor divisions shown towards the right side of my table. When this is done the larger and much more distinct groups shown down the centre of the table have to be regarded as subfamilies, and these writers assign to seven or eight different subfamilies the British forms alone. But some of these so-called subfamilies are far more nearly related than others, and accordingly the four very distinct main groups into which they fall, shown towards the left side of my table, are now having to be given the rank of separate families : indeed the first of them has been so regarded for several years by some authorities, and named the Fruticicolidæ or Bradybænidæ, although it seems to differ no more from the second than the second does from the third main group or the third from the fourth. Finally, since all these forms are far more nearly allied to one another than to any of

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[10] *Bulletin de l'Acad. Polonaise des Sciences et des Lettres, Série B : Sciences Naturelles*, 1924, pp. 134–186, pls. 6–11 ; *X^e Congrès Internat. de Zoologie*, 1929, pp. 962–979.

- HELICIDÆ
  - FRUTICICOLINÆ
    - *Fruticicola* Held — *fruticum* (Müll.)
  - HELICODONTINÆ
    - *Helicodonta* Fér. — *obvoluta* (Müll.)
  - HELICINÆ
    - *Helicigona* Fér. (or *Vortex* Oken) — *lapicida* (Lin.)
    - *Arianta* Turton — *arbustorum* (Lin.)
    - *Theba* Risso — *pisana* (Müll.)
    - *Helix* Lin.
      - *Cepæa* Held — *hortensis* Müll.; *nemoralis* Lin.
      - *Cryptomphalus* Moq. (or *Cornu* Born) — *aspersa* Müll.
      - *Helix*, s.s. — *pomatia* Lin.
  - HELICELLINÆ
    - *Hygromia* Risso, s.l.
      - *Hygromia*, s.s. — *limbata* (Drap.)
      - *Zenobiella* G. & W. — *subrufescens* (Miller)
      - *Monachoides* G. & W., *Urticicola* Ldm. — *umbrosa* (Pfr.)
      - *Trichia* Hartm.
        - *Trichia*, s.s. — *striolata* (Pfr.); *hispida* (Lin.); *liberta* (Westld.)
        - *Ponentina* Hesse — *montivaga* (Westld.); *subvirescens* (Bellamy)
    - *Monacha* Fitz., s.l.
      - *Ashfordia* Taylor — *granulata* (Alder)
      - *Monacha*, s.s. — *cartusiana* (Müll.); *cantiana* (Mont.)
    - *Helicella* Fér.
      - *Candidula* Kobelt — *caperata* (Mont.); *gigaxii* (Pfr.)
      - *Cernuella* Schlüter — *virgata* (da Costa)
      - *Xerocincta* Montrs. — *neglecta* (Drap.)
      - *Helicopsis* Fitz. — *striata* (Müll.)
      - *Helicella*, s.s. — *itala* (Lin.)
      - *Trochoidea* Brown — *pyramidata* (Drap.); *elegans* (Gmel.)
    - *Cochlicella* Fér. — *acuta* (Müll.)

the remaining families represented in the British Isles, a super-family or stirps Helicacea has had to be established to include them all and take the place of the old family Helicidæ, and a series of other super-families has been introduced for the remaining families of snails.

This general inflation of systematic values and dismemberment of genera seems to have little to commend it. To the specialist it may be convenient, but to the average collector it is very inconvenient and apt to deceive him into thinking that there is far more anatomical diversity among the British Helicids than is actually the case. And it is especially apt to be misleading when the adoption of these numerous small genera is combined with the rejection of the subfamilies into which they were grouped, as is done in this List, thus wrongly implying that the differences which separate *H. virgata* and *caperata*, for example, are of comparable importance with those that separate *H. subvirescens*, *obvoluta*, and *lapicida*, which the author also merely places consecutively in different genera. I therefore venture to think that, at least for the purposes of this List, it would be better to include all the forms in the family Helicidæ, to regard the four main groups shown towards the left side of my table as subfamilies, and to continue to treat the groups down the centre of the table as genera and the minor divisions towards the right as subgenera and sections.

TROCHOIDEA, *CERNUELLA*, *CANDIDULA*, AND OTHER SUBGENERA OF *HELICELLA*.

The comparative anatomy of the numerous subgenera of *Helicella* was carefully studied by Hesse,[11] who found that, apart from *Cochlicella*, they were all so closely related that he did not give to any of them generic rank, although usually he preferred to recognize many small genera. In this he has been followed by other authorities, such as Geyer (1927), Mermod (1930), Germain (1930), Thiele (1931), Ehrmann (1933), and Pilsbry (1939), in their well-known works. It is therefore to be regretted that the author of this List has reverted to the usage of Kennard and B. B. Woodward (1926), who, despite the mutual affinities of these groups, treated all those that occur in the British Isles as distinct genera, except *Xerocincta*, to which they did not even give subgeneric or sectional rank, but united it completely to one of the other groups with which its relations do not seem to be especially close, namely, the one erroneously called *Xerophila* by them and *Planatella* in the present List.

It might perhaps be thought that the sharply keeled pyramidal shell of *H. elegans* (Gmel.) might help to justify generic rank being given to the group to which it belongs, and which is rightly named *Trochoidea* in this List, although Kennard and Woodward called it *Xeroclivia* on grounds that had been shown to be scarcely tenable.[12] But the presence of a keel has been proved to be of very little systematic importance, and in some species closely related to *H. elegans* and belonging to the same subgenus the periphery of the shell is rounded as in most groups of *Helicella*.

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[11] *Archiv für Molluskenkunde*, vol. lviii, 1926, pp. 113–141.

[12] Watson : *Journ. of Conch.*, vol. xvi, 1922, pp. 281 and 282.

Anatomically, however, there would seem to be little to justify the placing of *Trochoidea* immediately before the subgenus *Cernuella*, and this is not where it is placed by Thiele, whose arrangement the author states that he is following. But it is difficult to arrange the subgenera of *Helicella* n a satisfactory linear sequence, since they often seem to have diverged from a common stem in different directions. Perhaps in the present state of our knowledge the most natural arrangement is to classify them into (1) those with the dart-sacs on one side of the vagina, and (2) those with them on both sides, and this is what I have attempted to do in the table on page 58.

Planatella Clessin, 1876, or *Helicella* Fér., 1821.

The familiar name *Helicella* Fér. is transferred in this List from the well-known genus for which it has nearly always been employed, to the different genus which includes *Theba pisana* (Müll.), and for which it is never used. This transference would inevitably cause great confusion if many were to adopt it, and I am not alone in thinking that if the strict application of the Rules should necessitate beyond all possible question that this change should be made the International Commission should be asked at the first opportunity to exercise its power of suspending the Rules in this case, on the ground that their application will clearly result in greater confusion than uniformity. If, however, it is doubtful or open to dispute that the strict application of the Rules would necessitate this disconcerting change, then clearly it should not be made, as it would be contrary to the principles expressed in Opinions 93 and 107. And it is quite evident that the need for this change will be disputed.

The reason that the author gives for transferring the well-known name *Helicella* Fér. to another genus is that he believes that the earliest valid publication of this name was in the explanation of Plates 27 and 30 in de Férussac's *Histoire Naturelle*, and not in his *Tableaux Systématiques* as has been supposed; and as the only two species placed in *Helicella* in the explanations of these Plates were both related to *Theba pisana* one of these must be taken as the type of de Férussac's subgenus. Now, in the first place, the exact dates of publication of the various parts of de Férussac's two works have been a matter of dispute and not everyone will agree with those that are accepted by this author. Secondly, it is doubtful whether the publication of the name *Helicella* on the explanation of these two Plates fulfils the conditions stipulated in Article 25 (*a*) which states that to be valid the publication of a name must be " accompanied by an indication, or a definition, or a description ". Clearly these explanations of Plates do not contain any description of the genus *Helicella*, nor any definition of it—unless we were to suppose that the word " definition " when employed in the Rules has not its customary and true meaning, a supposition which would hardly accord with the fact that further on in Article 25 the same word is implied to mean, as usual, something in the nature of a diagnosis or condensed description or other summary of characters. And no one could discern the characters defining the subgenus merely from the illustration or mention of two related species belonging to it, when neither was said to be typical, and when, on the same date (according to the author), de Férussac stated in his "Tableau" that it equally included three other groups of species, which he placed first in the subgenus. The question therefore is whether these explanations of Plates contain what the Article means by an "indication". What this implies is explained in Opinion 1 (B), in which it is stated that with regard to generic names the word indication is to be construed as (1) a bibliographic reference, or (2) a definite citation of an earlier name for which a new name is proposed, or (3) the citation or designation of a type species. A published figure or illustration is only regarded as a sufficient indication in the case of a specific name. Now the author does not maintain that these explanations of Plates contain any bibliographic reference in regard to *Helicella*, nor any citation of an earlier name for which it was proposed, nor any designation of a type species. Indeed he finds it necessary to select a type species himself. Thus it seems extremely doubtful whether the name *Helicella* was published in these explanations of Plates in the *Histoire Naturelle* in accordance with the conditions stipulated in Article 25 (*a*). On the other hand *Helicella* is briefly but not inadequately defined on page 28 (or 24) of de Férussac's *Tableau de la famille des Limaçons*, and is there stated to include four groups of species, which are dealt with in detail on pages 42–50 (or 38–46), after a fuller description of the subgenus on page 41 (or 37). It is therefore quite clear that the name *Helicella* was published in the *Tableaux Systématiques* in accordance with Article 25 (*a*).

De Férussac, however, included so many diverse species in his subgenus that subsequent authors attempted to restrict its scope and also raised it to generic rank. The most successful of these attempts appears to have been that of Hartmann,[13] who restricted it to the group that contains *H. itala* Lin. or *H. ericetorum* Müll., and Herrmannsen [14] selected this species as the type of *Helicella* as restricted by Hartmann, a fact that has been repeatedly pointed out by Pilsbry [15] and others.[16] The way in which Hartmann refers to de Férussac when restricting the latter's subgenus and raising it to generic rank sufficiently refutes the view that he was really proposing a new genus of his own which he happened to name *Helicella* by coincidence. From the above facts it would seem evident that those who wish to follow the International Code, and especially Article 25 (*a*) and Opinions 1, 93, and 107, should certainly not transfer the name *Helicella* in the way that is proposed in this List.

LONGÆVA Menke, 1830, COCHLICELLA Fér., 1821, and RUMINA, Risso, 1826.

Here again the author of this List appears, on what seem to be quite insufficient grounds, to transfer a well-known name from one genus to another contrary to current usage in a way that would cause great confusion. For he suggests that the name *Cochlicella* Fér., which is almost invariably used for the genus that includes *C. conoidea* (Drap.), *C. ventrosa* (Fér.), and *C. acuta* (Müll.), should be transferred to the quite different genus which has long been known by the name of *Rumina* Risso. The reason given for this confusing alteration is that in 1829 Dr. Thon selected *B. decollatus* Lin. "as the type of *Cochlicella* Férussac 1821 and this selection is valid", although in 1847 Gray selected *H. conoidea.* This statement, however, seems to be at variance with the facts.

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[13] "*Erd- und Süsswasser-Gasteropoden der Schweiz*," vol. i, 1842, pp. 143 and 144.
[14] Op. cit., vol. i, 1847, p. 507.
[15] *Proc. Malac. Soc.*, vol. xv, 1922, p. 39.
[16] E.g. Watson : *Journ. of Conch.*, vol. xvi, 1922, pp. 279 and 280

In his article on *Helix* in Ersche and Grube's Encyclopædia [17] Thon does not select types for de Férussac's subgenera, but only for the subordinate groups of species that Thon terms "families". For example, under *Helicella* he selects four types, one for each of the "families" included in the subgenus, but none for *Helicella* itself. Similarly he selects "*Bulimus decollatus* Bruguière" as the type of the "family" *turritæ*, but he does not select any type for the subgenus which contains this "family" and which he names *Cochlicolla*, not *Cochlicella.* It is true that he does not include any other "families" in *Cochlicolla*, but this makes little difference since groups with the same limits may have different type species. Therefore, as the expression "select the type" should be rigidly construed, it appears that Thon did not select the type of *Cochlicolla*, still less that of *Cochlicella* Fér., and accordingly he did not render Gray's selection invalid. And even if anyone should consider this conclusion open to controversy, the discarding on such questionable grounds of the name *Rumina*, which has so long been in general use for the genus containing *R. decollata* (Lin.), and its replacement by a name that is widely employed for quite a different genus would not only cause great confusion but would be contrary to Opinion 93, which states that "names now current are not to be discarded unless the reasons for change show a clear-cut necessity".

On very different grounds Pilsbry has maintained that *Cochlicella acuta* (Müll.) should henceforth be known as *Longæva acuta* (Müll.).[18] He accepts Gray's selection of *H. conoidea* Drap. as the type of *Cochlicella*, and although he admits that the anatomy of this species stands in need of further investigation he assumes that it resembles that of *C. ventrosa* Fér. sufficiently for these two forms to be congeneric. On the other hand he considers that the anatomy of *C. ventrosa* (Fér.) and that of *C. acuta* (Müll.) are so different that the latter species should be removed to a separate genus. Now the anatomy of *Cochlicella acuta* (Müll.) is well known, and the older accounts of that of *C. ventrosa* (Fér.), based on Moquin-Tandon's observations, certainly suggest that the two species differ very widely in their genital organs. But this is not the case. Having dissected specimens of *C. ventrosa* (Fér.) from the south-west of France and South Africa—where this species has become naturalized—I can confirm the accuracy of the anatomical descriptions and figures of Odhner [19] and Hesse,[20] who showed that the older accounts were incorrect. Actually the two species closely resemble each other in most features of their anatomy, including the genital ducts, which only seem to show two differences of any importance. First, the slender part of the appendicula, which both species possess instead of a dart-sac, is in *C. ventrosa* (Fér.) more deeply split into a larger number of branches, usually four or five ; but this difference, though rather conspicuous, should not be regarded as of more than specific importance, and may be due to the last whorl of *C. ventrosa* (Fér.) not being as narrow as that of *C. acuta* (Müll.). Secondly, the peculiar calcareous plate that strengthens the male organ in *C. acuta* does not seem to be present in *C. ventrosa.* But many years ago Adolf Schmidt described and figured a similar calcareous plate in *C. conoidea* (Drap.)[21] ; in this respect, therefore, *C. acuta* (Müll.) agrees more closely with the type species of *Cochlicella* than does *C. ventrosa* (Fér.). Thus in the present state of our knowledge there would seem to be no justification for placing *C. acuta* (Müll.) in a separate genus.

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[17] "*Allgemeine Encyklopädie der Wissenschaften und Künste,*" ii, vol. v, pp. 136–148.

[18] "*Land Mollusca of North America,*" vol. i (pt. 1), 1939, p. 23.

[19] *Arkiv för Zoologi*, vol. xxiii A, 1931, no. 14, pp. 80 and 81.

[20] *Zoologica*, vol. xxxiii, Heft 85, 1934, p. 31, pl. 6, figs. 53 *a* and *b*.

HYGROMIA RISSO AND ITS ALLIES.

The group consisting of *Hygromia*, *Zenobiella*, *Monachoides*, *Trichia*, etc. is rather closely related to *Helicella*, and in the course of evolution it has become split up in a somewhat parallel manner. For example, *Zenobiella* resembles *Xerocincta* in having a double dart-sac on one side of the vagina, *Monachoides* resembles *Candidula* in having only a single dart-sac on one side, while *Trichia* resembles *Helicopsis* in having a double one on each side of the vagina.

The common ancestor of both groups probably lived in or near Central Europe. The *Hygromia* group seems to have remained there, and also to have spread to the east, the west, and the north. The *Helicella* group, on the other hand, seems to have migrated southwards to the sunnier lands of the Mediterranean Region, and to have undergone two changes. First, the retractor of the right upper tentacle became disentangled from the genital organs, so that both the male and female ducts lay wholly on the right of it. And as this moved the penis further from the right cerebral ganglion and nearer to the right pedal ganglion, the superficial origin of the penial nerve seems eventually to have been transferred from the former ganglion to the latter, unless an appendicula happened to be in the way. Secondly, the shell became more opaque and calcareous in order better to protect the animal from the increased amount of sunshine to which it was now exposed, any translucent bands that were left being obscured by the brown pigment being concentrated in them.

At an early stage and before this second modification had developed to more than a very small extent, the ancestors of *Monacha* and *Ashfordia* probably branched off from this group, and some of them spread northwards again and reached the British Isles, while others spread eastwards to Asia Minor. In the extreme south-west *Ochthephila* Beck (= *Geomitra* Swainson) appears to have been evolved from the same group, but probably a little later.[22] Then this *Helicella* group gave rise to *Cochlicella*, apparently on the coast, where it seems to have become specially adapted to living on sand dunes, etc. This small genus then spread northwards up the Atlantic coast to the British Isles, and also found its way inland where the soil was sufficiently calcareous and the winters sufficiently mild. Meanwhile *Helicella* itself extended far and wide throughout the Mediterranean Region, becoming divided into its numerous subgenera, a few of which spread northwards through France to this country, while two or three returned to Central Europe, where, however, they betray their southern origin by preferring to live in sunnier situations than those in which the species of *Trichia*, *Monachoides*, etc., are normally found.

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[21] *Abhandl. d. Naturwissenschaft. Vereines f. Sachsen u. Thüringen in Halle*, vol. i, 1855, p. 41, pl. x, fig. 79.

From this brief account it will be seen that the *Hygromia* group is somewhat older and more primitive than that containing *Helicella* and its nearest allies, although it is in some respects less primitive than the larger Helicids such as *Helix* itself. It should therefore come before *Monacha*, *Helicella*, *Cochlicella*, etc., in any classification in which the genera are arranged in ascending order, though probably after the other Helicidæ. And as the group is older its divisions have had time to diverge a little further from one another in their anatomy than have the corresponding divisions of *Helicella*. It is therefore not surprising that Hesse and other authorities, who have rightly regarded the divisions of *Helicella* as only subgenera, often give generic rank to the more or less parallel divisions of the *Hygromia* group. Nevertheless it is difficult to divide this group into clearly separated genera. For example, *Zenobiella*—to which *H. subrufescens* (Miller) (= *H. fusca* Mont.) belongs—was first associated by Hesse with what we now call *Monachoides*,[23] but later he realized that it was still more nearly related to *Hygromia*, s.s., of which he then made it a section,[24] as I had done some years previously.[25] Again, *H. rubiginosa* (Schmidt), which belongs to *Monachoides*, is externally remarkably like *H. liberta* (Westld.) or *sericea* (Drap.), belonging to *Trichia*. Thirdly, *Pyrenæaria* Hesse [26] is anatomically almost exactly intermediate between *Zenobiella*, *Monachoides*, *Trichia*, etc., and seems to link them all together. We may therefore be inclined to follow Pilsbry [27] and regard all these as subgenera of *Hygromia*, though realizing that they are rather more distinct from one another than are the corresponding subgenera of *Helicella*

It is quite clear, however, that, notwithstanding its degenerate dart-sacs, *Ponentina* Hesse—to which *H. subvirescens* (Bellamy) belongs—is much more nearly related to *Trichia* than *Trichia* is to *Zenobiella* and the other groups, so that, even if these were to be regarded as generically distinct, *Ponentina* should only be treated as a section or subgenus of *Trichia*. On the other hand, it is also clear that *Ashfordia* Taylor—of which *H. granulata* (Alder) is the type—is much further removed from these groups than they are from one another, and is more nearly related to *Monacha cartusiana* (Müll.) and *cantiana* (Mont.), as shown in my table. Yet *Ashfordia* differs quite as much from *Monacha* as *Hygromia*, *Zenobiella*, *Monachoides*, and *Trichia* differ from one another, and should be given generic rank if any of these groups are separated generically. Hesse in 1931 [28] regarded *Ashfordia* as a distinct genus, but he still treated *Ponentina* as a subgenus of *Trichia* (which he called *Fruticicola*). To merge *Ashfordia* into *Monacha* and at the same time to raise *Ponentina* to generic rank, as is done in this List, would seem to be strangely at variance with the anatomical evidence.

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[22] See Watson : *Proc. Malac. Soc.*, vol. xv, 1923, pp. 290–3.

[23] *Archiv. für Molluskenkunde*, vol. liii, 1921, p. 66.

[24] *Zoologica*, vol. xxxi, Heft 81, 1931, p. 12.

[25] *Proc. Malac. Soc.*, vol. xiii, 1919, p. 130.

[26] *Archiv. für Molluskenkunde*, vol. liii, 1921, pp. 59, 61, 66 ; *Zoologica*, vol. xxxi, Heft 81, 1931, pp. 18 and 19, pl. 3, figs. 14*a–c*.

[27] "*Land Mollusca of North America*," vol. i (pt. 1), 1939, p. 16.

Hygromia odeca (Locard) or *H. limbata* (Drap.).

Twenty-three years ago [29] I was able by anatomical examination to confirm the fact that the species of *Hygromia* s.s., found in South Devon is identical with the common French snail for which Draparnaud's familiar name *H. limbata* has been generally employed ever since he gave it to it in 1805, this name having been used for it in almost every work of importance, including the most recent standard books on both French and British snails by Germain and Ellis respectively.

On the other hand, *H. odeca* Loc. is a scarcer French form which Bourguignat and Locard considered to be specifically distinct from *H. limbata* Drap., a view which I have some reason to suspect may possibly prove to be correct, although some authorities consider that the two forms are conspecific. Clearly therefore it would be extremely confusing if we were to apply the name *H. odeca* Loc. to the specimens of *H. limbata* Drap. that occur in England, as is done in this List.

Moreover Draparnaud's name has 77 years' priority over Locard's, and so far as I am aware the only reason that has been given for discarding it is that da Costa is stated to have given the name *Helix limbata* in 1778 to a fresh-water snail that had been twice named already, the one we now call *Planorbis planorbis* (Lin.). It is therefore supposed that, although no confusion would result in continuing to use Draparnaud's familiar name, it is technically pre-occupied.

But a study of da Costa's work [30] shows that, although he classified the *Planorbis* in the genus *Helix*, he did not name it *Helix limbata* nor *H. limbata*, but simply gave to it the uninominal specific name, *Limbata*. In synonymy he states that his *Limbata* is the same as Pennant's *H. Planorbis*, but this latter name is the only binominal one that he applies to the species. Similarly he gives to the next form he describes the uninominal specific name *Planorbis*, although in his synonymy of the species he shows that its binominal name, adopted by Pennant, is *H. vortex*.

It cannot be maintained that as the name *Limbata* seems to be adjectival in character this indicates that it is half a binominal name, the substantive *Helix* being understood ; for da Costa's new generic name *Strombiformis* is similarly adjectival and can scarcely be the second half of a binominal designation. Nor can it be maintained that the absence of "*Helix*" or "*H.*" may be due to a slip of the pen or a printer's error, because da Costa consistently employs similar uninominal specific names throughout the part of his book that deals with "Revolved Univalves", and equally consistently uses binominal specific names in those parts dealing with "Simple Univalves", "Bivalves", and "Multivalves". The different treatment seems to be deliberate. It is important to remember that in the eighteenth century binominal nomenclature had not yet come into general use; some authors adopted it, others rejected it, and da Costa apparently made the compromise of using it in the first and in the last two parts of his work, but not in the second part.

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[28] *Zoologica*, vol. xxxi, Heft 81, pp. 11 and 42.

[29] *Proc. Malac. Soc.*, vol. xiii, 1919, pp. 120–132, pls. ii and iii.

[30] "*Historia Naturalis Testaceorum Britanniæ*," 1778.

Now a uninominal specific name like *Limbata* has no standing under the International Rules, for according to Article 2, while the scientific name of a subgenus or higher group is uninominal, that of a species must be binominal, and according to Article 25 (*b*) a name is only valid if the author has applied to it the principles of binary nomenclature. Had da Costa termed his divisions of *Helix* subgenera instead of species—and some of them might be thought to agree better with what we now consider to be subgenera—then it could scarcely have been maintained that his name *Limbata* was invalid for the subgenus because it was binominal and not uninominal; and as it cannot be both, it is difficult to see how it can be valid for a species according to the Rules.

In any case, whatever da Costa may have intended, it may be argued that if the binary name *Helix limbata* does not appear in print in his work then the validity of Draparnaud's *Helix limbata* remains unimpaired if the Rules are strictly followed.

Even if anyone were to doubt the cogency of the above argument, the most that such a critic could maintain is that the matter is one subject to difference of opinion, especially as others besides myself refuse to admit that Draparnaud's name should be rejected. Accordingly the principle would then apply to it that is expressed in Opinion 107, which says in effect that a name in current use is not to be supplanted by one that has been rarely, if ever, adopted unless the argument for doing so is unambiguous and the premises are not subject to difference of opinion.

Trochulus Fér., 1821, or *Trichia* Hartmann, 1840.

The genus or subgenus which contains *H. hispida* Lin. and *H. striolata* Pfr., and is named *Trichia* in the well-known works of Thiele 1931, Pilsbry 1939, Ellis 1926, and others, has been called *Capillifera* by Kennard and B. B. Woodward, *Fruticicola* by Hesse and some other Continental authorities, and *Trochulus* by Lindholm and the author of the List we are considering.

The name *Trichia* Hartmann, 1840, is to be preferred to *Capillifera* Honigm., 1906, because it has sixty-six years' priority, and, as I have already shown,[31] *Trichia* Hartmann is not preoccupied by *Trichia*

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[31] *Journ. of Conch.*, vol. xvi, 1922, p. 278.

Hoffmann, the name given in 1790 to an organism then considered to be a plant, nor by *Trichia* de Haan, 1841, nor by *Trichius* Fabricius, 1775.

Trichia is also preferable to *Fruticicola* Held, 1837, because Herrmannsen designated *H. fruticum* Müll. as the type of *Fruticicola*,[32] and this name has therefore been recently used by authors like Thiele for the genus formerly known as *Eulota* Hartmann, 1840.

Thirdly, *Trichia* is preferable to *Trochulus*, because it is agreed that Chemnitz, the original author of *Trochulus*, was not consistently binomial when he proposed the name in 1786. And the mere fact that a generic name proposed by a non-binomial author sometimes happens to consist of one word, or a specific name of two, does not render it any more valid than if it had been multi-nomial or pre-Linnæan. Moreover, as Pilsbry has recently pointed out in dealing briefly with this very case,[33] if such an invalid name is simply quoted without being adopted by a subsequent author who is binomial, such as de Férussac or Beck, it is illogical to suppose that this would so alter the character of the name as to render it valid. The case is analogous to the citation of a pre-Linnæan name by a post-Linnæan author, in which it has been decided that such a name does not become eligible under the Code unless the later author has adopted it himself (Opinion 5). On the other hand, if a binomial author proposes a new name which is not pre-occupied and is valid in every way except that the work in which it is proposed was not properly published but remained in manuscript or in proof, it may then be held that if another binomial author cites this name in a work that is properly published this will render the name valid, as in giving it the requisite publicity it will have removed the only impediment to its validity. But such a case is not parallel to the present one in which the impediment is in the character of the name itself rather than in any lack of publicity that was given to the original work in which it appeared. In other words, if a name is invalid solely because it has not been properly published it may be held to become valid as soon as it is properly published, but if a name is invalid because it has not been proposed by a binomial author it will not become valid until it is proposed or adopted by an author who is binomial.

Helicodonta Fér., 1821.

The author of this List states that Article 28 of the International Code precludes the use of the name *Helicodonta* Fér., just as he stated that the same Article rendered the name *Cochlicopa* Fér. invalid. But, as I pointed out on page 30 in dealing briefly with the latter name, most people would probably consider that it was not these names of de Férussac that were invalid but the author's reasons for rejecting them, their validity being unaffected by Article 28. The fact, however, that the author continues to employ the name *Helicodonta* Fér. in his List, although he supposes this use to be contrary to the International Code, proves, if further proof be needed, that whatever may be his purpose in wishing to change so many names it cannot be because he thinks that the Rules should always be followed whenever he believes that they require a change to be made.

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[32] "*Indicis Generum Malacozoorum Primordia*," vol. i, 1847, p. 450.

[33] "*Land Mollusca of North America*," vol. i (pt. 1), 1939, p. 16.

THEBA (or "*HELICELLA*") *PISANA* (Müll.).

In the present List *H. subdentata* Fér. is designated as the type of *Helicella* on page 265 and both *H. subdentata* Fér. and *H. pisana* Müll. on page 273, as if to emphasize the contention that the far older selection of Herrmannsen should be rejected and that the well known name *Helicella* should be transferred from the genus for which it is now always employed to that containing these two species. I have already attempted to point out, however, on page 60, that the reasons given for proposing this very confusing change are open to dispute and the transference of the name *Helicella* to this different genus should not be accepted by those who wish to follow the International Code, particularly the principles expressed in Opinions 93 and 107.

Until recently the smaller genus containing *H. pisana* Müll. has usually been called *Euparypha* Hartmann, 1844, but *Xerophila* Held, 1837, is older and has the same type selected by Herrmannsen, while *Theba* Risso, 1826, is older still and also has *H. pisana* as its type species designated by Gray in 1847. Therefore authors like Thiele and Pilsbry rightly use the name *Theba* Risso for this genus, although at one time it was used for the quite different genus that includes *H. cantiana* (Mont.) and *H. cartusiana* (Müll.) and is now called *Monacha* Fitzinger, 1833.

An interesting parallel may be drawn between the genus formerly called *Theba* but now known as *Monacha* and the one that is now called *Theba* but was formerly known as *Euparypha*. *Monacha* and its close ally *Ashfordia* are somewhat transitional between *Hygromia* in a broad sense and *Helicella*, possessing some characters of each, and I have already suggested that this can be most simply explained by supposing that the ancestors of *Monacha* and *Ashfordia* diverged from the branch giving rise to *Helicella* at an early stage before some of the characters that distinguish *Helicella* from *Hygromia* were developed. The view that the ancestors of *Monacha* and *Ashfordia* thus separated from *Helicella* at an early date is supported by the fact that their anatomy has had time to become specialized along lines of their own. Thus in *Monacha* the penial retractor muscle has wholly disappeared and there is a long appendicula instead of a dart-sac, while in *Ashfordia* both the dart-sac and the mucous glands have disappeared entirely. Similarly the genus now named *Theba* and formerly called *Euparypha*, while undoubtedly related to *Helix*, retains some primitive characters that *Helix* has lost but are still found in genera like *Arianta*, as, for example, its possession of a large number of small chromosomes [34] and only two large undivided mucous glands. This seems to be most easily explained by supposing that the ancestors of the present genus diverged from those of *Helix* at a rather remote period. And this view is supported by the fact that *Theba* has had time to become somewhat specialized in other ways, the dart-sac and dart though present having become greatly reduced in size and the flagellum having usually disappeared completely, while, according to Poliński,[35] the arterial system has become specialized as well. The shell also has become modified to form a better protection to the animal in the relatively dry and sunny situations in which it lives, the opaque white substance of the shell having invaded the translucent bands and usually split them up into narrow lines or spots, which, however, are still normally arranged in four groups corresponding to the four bands that are found in the normal form of species such as *Helix aspersa.*

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[34] See Max Perrot, *Compte Rendu d. Séances Soc. de Physique et d'Hist. Nat. de Genève*, vol. lvi, 1939, pp. 32–5.

In my opinion the existence of these more or less transitional genera helps to unite the groups between which they are intermediate ; but some Continental authorities think that they afford a reason for establishing still more subfamilies, Germain having proposed the subfamily Thebinæ for the genus now called *Monacha* and its nearest allies, and Poliński and Max Perrot the subfamily Euparyphinæ for the genus now called *Theba.*

Cepæa Held.

In giving generic rank to *Cepæa*, to which *H. nemoralis* Lin. and *H. hortensis* Müll. belong, the author of this List is following the example of the majority of modern systematists ; for the larger Palæarctic Helicids, with shells that normally have four or five bands, are now commonly divided among several genera differing to some extent from one another both in the shape of the shell and in certain details of the internal organs such as the genital ducts.

It may be worth emphasizing, however, that in most cases the anatomical differences between these groups are quite small. Thus *Cepæa* differs from *Helix* in that the mucous glands are divided into fewer branches, but in both groups the number varies considerably, and the smaller number in *Cepæa* may perhaps be due simply to the last whorl not being as broad as in *Helix* and therefore leaving less room for the development of a large number of branches. On the other hand, in its dart *H. nemoralis* agrees more closely with *H. aspersa* than with *H. hortensis* ; and although the receptacular diverticulum is shorter in both *H. nemoralis* and *H. hortensis* than it is in *H. aspersa*, this is not so in their Continental ally *H. sylvatica* Drap. Moreover, in *H. pomatia* Lin. it is shorter still or entirely absent, and this species differs from all the others just mentioned in the flagellum arising close to the insertion of the penial retractor instead of some distance behind it. Thus, not only in its imperforate shell and thin epiphragm, but also in its genital ducts, *H. aspersa* differs quite as much from *H. pomatia* as *H. nemoralis* does from either species. Yet Thiele only places *H. pomatia* and *H. aspersa* in separate sections of *Helix*, and other authors merely assign them to separate subgenera. It is true that in both *H. pomatia* and *H. aspersa* the ectocones of the central and admedian teeth of the radula are more distinct than in *Cepæa*, but in the South European species *H. aperta* Born the radula is still more distinctive, having well marked endocones on the admedian teeth; yet this species is not considered to be more than sectionally or subgenerically distinct from *Helix* itself, notwithstanding its thin, uniformly green, paucispiral, imperforate shell. Furthermore, the anatomical differences that separate *H. nemoralis* and *hortensis* from *H. aspersa*, etc., seem to be no greater than those that separate *Testacella haliotidea* Drap. from *T. scutulum* Sow., two species which are not even placed in different sections; and they are far less than those that separate *Monacha cantiana* (Mont.) and *Ashfordia granulata* (Alder), or *Vitrina pellucida* (Müll.) and *V.* (*Semilimax*) *pyrenaica* (Fér.), or *Succinea* (*Quickella*) *arenaria* B.-Ch. and *S.* (*Oxyloma*) *pfeifferi* Rossm., for example. From an anatomical point of view, therefore, it would seem more consistent to regard *Cepæa* as a subgenus of *Helix* rather than as a distinct genus. And if subfamilies are omitted from a classified list, as they are from this one, and *H. nemoralis* and *hortensis* are made to appear just as distinct from *H. pomatia* and *aspersa* as *H. obvoluta* is from *H. subvirescens* or *lapicida*, the result is apt to be very misleading.

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[35] *X^e Congrès Internat. de Zoologie*, 1929, pp. 970 and 971.

SEQUENCE IN *HELIX*.

It will be seen from the above account that not only do *H. aspersa* Müll. and *H. pomatia* Lin. belong to separate sections or subgenera, but it would accord better with our knowledge of their natural relations to place them in this order, *H. aspersa* coming first, nearest to *H. nemoralis* and *hortensis*. In placing them in the opposite sequence the author of this List once again ignores both the anatomical evidence and the arrangement of Thiele, which he professes to be following.

PELECYPODA.

The criticism of that part of the List that deals with the bivalves I must leave almost entirely to those who have a fuller knowledge of this group than I possess. In passing, however, we may note that the author again departs from Thiele's arrangement,[36] both by placing in the middle of the Unionidæ a genus that Thiele, following Ortmann,[37] places first in a separate family, mainly because of its more primitive type of gills; and by giving generic rank to *Musculium* Link, which Thiele regards as a section of *Sphærium*, surely with better reason. And without going further into the matter we may also briefly note that the unfortunate suggestion that the name *Lymnium* Oken, 1815, should replace *Unio Retzius*, 1788, and that the latter name should be transferred to a different genus from that for which it is so widely used, is not likely to be accepted by those who wish to follow the principles expressed in the Opinions rendered by the International Commission. For the only reason that the author gives for suggesting this very confusing change is that Turton selected *Mya margaritifera* Lin. as the type of *Unio* in 1831, although

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[36] "*Handbuch der Systemat. Weichtierkunde*," vol. ii (pt. 3), 1934, pp. 816–853.
[37] *Nautilus*, 1911, vol. xxiv, p. 129, vol. xxv, pp. 6 and 7; *Annals of the Carnegie Museum*, vol. viii, 1912, pp. 223–230.

Kennard and Woodward,[38] in a paper specially devoted to the designation of types by the older authors, stated that they considered Turton's selections might be disregarded, as there was nothing to show that when he used the term "type" in his book he did not simply mean a British example of each genus. Moreover two other reasons for rejecting this alteration in nomenclature were given by Ortmann more than thirty years ago.[39] Accordingly it is impossible to regard this as a case in which "the premises are not subject to difference of opinion" and the change of a name in current use might therefore have been justifiable (see Opinions 93 and 107).

Introduced Species and Greenhouse Aliens.

It is difficult to take seriously the brief supplementary lists of non-marine Gastropods that have been accidentally imported into the British Isles. In them the species are neither arranged in accordance with the main List nor with their natural relationships, nor are they even placed in alphabetical order. At least half a dozen species, belonging to five different families of Pulmonates, are entirely omitted, although all these are introduced forms which seem to have become established in Britain. On the other hand, it is doubtful whether two of the forms that are included are distinct species, although they are here placed in separate genera, to neither of which they appear to belong. And some of the most familiar Continental species are assigned to the wrong genera, although their anatomy and affinities are well known. Thus, "*Ena*" *detrita* (Müll.) is now placed in the genus *Zebrina* Held, 1837. "*Trochulus*" *umbrosus* (Partsch in Pfr.) is the type of *Urticicola* Lindholm, 1927, which is a section of *Monachoides* Gude and Woodward, and not of *Trichia* Hartmann, here named *Trochulus*, to which this species does not belong. "*Planatella*" *neglecta* (Drap.) is the type of *Xerocincta* Monterosato, 1892, a subgenus of *Helicella*, related to *Cernuella* Schluter and other groups, but quite distinct from the subgenus *Helicella*, s.s., here unfortunately named *Planatella* and given generic rank. And I have already attempted to show that *Rumina decollata* (Lin.) should not be called "*Cochlicella*" *decollata* (see p. 62).

These supplementary lists, however, need not be considered further, for they can scarcely have been intended to be taken seriously. Indeed those who know how excellent are the author's writings on some other branches of conchology, or have the privilege of his acquaintance, may wonder whether the main List itself may not have been written simply to elicit criticism. If so I hope that these Notes, incomplete though they are, will show that its purpose has now been achieved. And perhaps what I have written may also be of some slight help in the compilation of a new classified List of the British Non-marine Mollusca to take the place of the last one for which the Society made itself responsible thirty-eight years ago.

---

[38] *Proc. Malac. Soc.*, vol. xv, 1922, p. 48.

[39] *Nautilus*, vol. xxv, 1911, pp. 89 and 90.

ACKNOWLEDGMENTS.

Among those to whom my gratitude is due I would especially thank A. E. Ellis, D. K. Kevan, J. R. le B. Tomlin, A. R. Waterston, and R. Winckworth for the kind encouragement and help that they have given me while compiling these notes, although I am alone responsible for the opinions that I have expressed.

Limax tenellus Muller.—In July last I was fortunate in taking two *Limax tenellus* Müller, measuring 28 mm. and 26 mm. when crawling, in High Wood, Hawkenbury, near Tunbridge Wells.

This appears to be a new record for this species in V.C. 16 Kent West. High Wood is an undisturbed mixed wood which covers something like one thousand acres just north of the Kent-Sussex border, and about 1½ miles east of Tunbridge Wells. The wood is of oak, ash, and beech with a sprinkling of conifers and some patches of chestnut (*Castanea sativa*). *Limax tenellus* was taken, in company with two *Limax maximus* and a half-grown *Arion circumscriptus*, under a large piece of bark which had fallen to the ground from a dead ash tree. The soil is acid, *Zonitoides excavatus* being a common species.

L. B. LANGMEAD.

Lymnaea palustris in Captivity.—I am very interested in Dr. Collinge's account of the dying out of his colony of this species, recorded by him in vol. 21, p. 327, because I have had somewhat similar experiences with other species.

It has never occurred to me, however, to put this down to interbreeding, and there seem to be various alternative explanations. I would therefore like to ask Dr. Collinge why he is so certain that the loss of fertility and eventual extinction of his colony was due to interbreeding. Unless his particular breed of *palustris* had inherited some lethal factor it seems scarcely likely that inbreeding alone would have produced this result.

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THE LYONS COLLECTION IN THE TENBY MUSEUM.

By A. S. Kennard, A.L.S., F.G.S.

By the kindness of A. L. Leach, F.G.S., Hon. Curator of the Tenby Museum, I have been able to inspect a series of non-marine mollusca forming part of the "Lyons" collection. They were nearly all small forms, mounted on cards, and for these reasons had escaped attention. A. G. Stubbs during his residence at Tenby had named some of the shells on loose labels, but they had then been placed in a cabinet drawer and left alone. Glue will dry, so some of the specimens were missing, the cards and the glue remaining as evidence of their former presence.

William Lyons was born in 1766, and in 1810 was included in a list of "Resident Gentry" in Voss's *Tenby Guide*. He died in 1849, aged 83, and his widow Sarah survived him till 1860, being then 92. They had twelve children, of whom five lived to be 73, 75, 75, 78, and 81 respectively. There is a memorial window to the family in St. Anne's Chapel, St. Mary's, Tenby. In 1878 the Lyons Collection was given to the Tenby Museum by his two surviving daughters, Jane and Sarah, with the stipulation that new names may be used, but the original names must be retained.

Though Lyons wrote nothing on the subject, it is clear from contemporary literature that he was an able student, a keen collector, and was in touch with many contemporary collectors with whom he made exchanges. The earliest reference to him that I can trace is by Montagu in 1803, who states that he had seen specimens "from Dover in Kent collected by Mr. Lyons" (7*a*, p. 439). He was apparently not a correspondent of Montagu, for in 1810 or earlier, Lyons detected a bivalve that he could not recognize, and gave examples to his friend Charles Norris, the artist, then living at Tenby, who sent one to Montagu. This was described and figured by Montagu in 1815 as *Mya striata* (8, p. 188, pl. xi, f. 1), but the paper was read on 5th March, 1811.

Montagu notes that the Rev. Mr. Bingley told him that Lyons had a number of specimens. One can infer that at this date the Lyons Collection was sufficiently famous to attract the attention of students. *Mya striata* Mont. is the well-known *Lyonsia norwegica* (Gmel.). Mr. Leach informs me that there are nine specimens in the Lyons Collection, but without locality; they are probably from Tenby.

Turton in 1819 only knew of him (10), but in 1922 they were friendly, for Turton made *Mya striata* the type of his new genus *Lyonsia*, stating: "We have dedicated it to our worthy correspondent Mr. W. Lyons, of Tenby, who first presented it to the notice of the British Naturalist" (11, p. 63), and also states that Lyons had sent him shell sand from Tenby (11, p. 257).

Jeffreys states in 1830 that he had seen "the extensive collection of Mr. Lyons" (3, p. 353), and in 1865 speaks of him as "the late Mr. W. Lyons an active British conchologist" (5, vol. iii, p. 28). Of that part of the collection I have examined, a fair number had been sent to him already mounted and named, and most of these can be definitely placed. The remainder had been mounted by Lyons and bear his script. In some cases the collector and locality are stated, and apparently in all cases he had copied the original labels, sometimes adding Draparnaud's and Montagu's names and a scrutiny of the original names has enabled one to trace the source. It is of the greatest importance to ascertain what the pioneers meant by the names they used. The Jeffreys Collection was allowed by a supine authority to go to America, though I gather that it has been relabelled so much by Jeffreys himself that its value has been diminished. The Alder Collection at Newcastle still awaits re-examination. Hence the importance of that part of the Lyons Collection that has been untouched for over one hundred years. Mr. Leach informs me that in the Tenby Museum is a framed copy of a large copper-plate engraving of shells, drawn by C. Norris, engraved by S. Rawle and "published for the Repository at Tenby 10th April, 1813". The engraving shows thirty-four species of marine shells grouped around the legend "Conchology of Tenby". Mr. Leach makes the very probable suggestion that Lyons furnished the originals. This conchological item must be very rare, and shows that shell collecting was fashionable and that Tenby even in those days was known as a good hunting ground. I am indebted to Mr. Leach for this information and for the personal data regarding a pioneer whose name will always be associated with the Mollusca.

Seven cards with names in pencil.

Succinea pfeifferi Rossm. These are labelled "*Helix oblonga*", and since the locality is stated to be Tenby, are probably Lyons' own collecting. Alder in 1830 listed this as *S. oblonga* Bean non Drap. (1), so the determination may be Bean's.

Ena detrita (Müll.) Two examples labelled "*Helix detrita* Dorsetshire". This is one of a number of spurious English species due to Mr. Bryer's careless labelling or worse. Montagu notes it as having been found in a pool near Weymouth and a stream near Dorchester by Mr. Bryer, but added that no one else had found it, and figured a specimen (7*a*, pp. 384–6, pl. xi, f. 1). It was recorded by Maton and Rackett (6, p. 217), and they cite in synonymy Pulteney, p. 49, t. 19, f. 26. Maton and Rackett's paper was read January, 1804, but was not published until 1807, whilst the second edition of Pulteney was not issued until 1813. This and similar citations show that the second edition was already printed at least in 1807, Rackett being the editor, for Pulteney died in 1801. Jeffreys refers to this record, and doubts the habitat and locality, and his doubts were well founded (4, p. 520).

However, the name being on the English list, there was a demand for specimens, and the dealers soon produced them. Gray notes: "The *Bulimus radiatus* of France and *B. exilis* of the West Indies are the species which generally occupy its place in the British cabinets" (14, p. 19). These two specimens are so far as I know the only survivors, but their source is not known. Lyons apparently concentrated on marine forms, and these two specimens were probably given.

Subulina octona (Brug.). Two cards, one shell each. One labelled "*Helix octona* Weymouth", the other "*Achatina octona* from Mrs. Pocock, Weymouth". Mrs. Pocock may be an error for Miss Pocock, who is cited as a collector by Donovan, Jeffreys, and Maton and Rackett. Jeffreys states: "Mr. Lyons informs me that his specimen of *Clausilia labiata* was presented to him by Miss Pocock" (4, p. 513). Maton and Rackett say: "We insert this species [*Helix octona*] solely on Dr. Pulteney's authority. He says, 'I have only found it dead and in a bleached state, but otherwise perfect'" and give a good figure (6, p. 211, t. 5, f. 10). The generic name of *Achatina* was probably taken from Turton (13, p. 90).

If correctly localized from a greenhouse or pine pit, it is curious that no exotic mollusca were ever recorded from the extensive hothouses of Loddige at Hackney, though Gray has noted that *Bulimus rosaceus* King from Chili lived there for some time (14, p. 7).

Physa fontinalis (Linné), labelled "111 *Physa alba*". *Physa alba* was described and figured by Turton and said to come from the River Towin in North Wales in 1825 (12, p. 363, pl. xiii, f. 3). No. 111 refers to the number of this species in Turton's Manual (13). These examples probably came from Turton and if so they are paratypes of his species. They certainly agree exactly with his figure.

Chondras similis (Brug.) labelled "*Pupa cinerea* vel *parvula*", seven examples, no locality. These are Continental specimens probably kept as examples of this species noted as English in 1821 by J. E. Gray in error (2, p. 239), and confirmed in 1833 by Jeffreys, also an error (4, p. 514): see Gray (14, p. 13). I have used the generic name of *Chondras* Gray 1821. Type *cinerea* (Drap.) = *similis* (Brug.) (2, p. 239) for this species, since there is no evidence that it is an error, and Gray may well have known of the earliest use of *Chondrus* Brisson 1760 Aves. *Chondras* is accepted as valid by Neave.

Ena montana (Drap.), no locality, labelled *Bulimus montanus*. No clue as to origin and the writing on the tablet is different from that on the others.

The following all bear Lyons' script, the local specimens being his collecting: *Ancylastrum fluviatile* (Müll.), Rivulet near Gumferston, June, 1810.

Aplexa hypnorum (Linné). Tenby.

Lymnæa truncatula (Müll.). Penelly near Tenby, May, 1823.

Ancylus lacustris (Linné). Portsmouth.

Ancylastrum fluviatile (Müll.). Dorsetshire.

Opeas pumilum (Pfr.) labelled "*Cochlicella clavulus*. Pineries at Bristol", probably ex J. S. Miller.

Punctum pygmæum (Drap.). Tor Abbey Wood labelled "*Helix umbilicata* Leach *Helix subfusca* Turton". Jeffreys states that he had specimens from this locality [Torquay] collected by General Bingham, sent by the Rev. Dr. Goodall (4, p. 512).

I have failed to trace the trivial name *subfusca* Turton, but presumably they are from Turton.

Lymnæa glabra (Müll.) labelled "Dorsetshire. Found by the Rev. — Bingley in a pond on the left between Litchet and Lower Litchet". This locality is given by Maton and Rackett (6, p. 212) and the collector is mentioned by Montagu (5, p. 188).

Lymnium tumidum (Retz.). Two valves labelled "*Mya pictorum* Gloucester. Riv. Severn Nov. 1810 John Walcott". But little is known apart from his writings of this early botanist and geologist who flourished *fide* B. B. Woodward, 1778–1822.

Twelve cards all bearing exact localities in Lyons' script from the vicinity of Axbridge, Somerset.

Azeca goodalli (Fér.) "on side of Mendip Hill opposite Langford".

Zua lubrica (Müll.). "N. side of Mendip Hill opposite Langford."

Pupilla muscorum (Linné). "Under Churchill Batch."

Lauria cylindracea (da Costa). "Churchill Batch and on Mendip."

Ena montana (Drap.). "Smallwood on Mendip opposite Langford."

Balea perversa (Linné). "Orchard under Mendip Hill."

Marpessa laminata (Mont.). "Mendip Lodge."

Vitrea crystallina (Müll.). "N. side of Mendip Hill opposite Langford."

Oxychilus cellarium (Müll.). 3 ex. and *Retinella nitidula* (Drap.) 2 ex. "Langford" on one card.

Retinella radiatula (Ald.). "N. side of Mendip Hill opposite Langford." Labelled "*Helix striatula* Bingham".

Candidula caperata (Mont.). "Langford."

Vortex lapicida (Linné). "Goblin Coombe."

Pomatias elegans (Müll.). "Churchill Batch."

This series is from one collector and the reference to Bingham (General Bingham) may be the clue.

SPECIMENS ex W. BEAN.

Nine cards with W. Bean's characteristic script. Mr. Tomlin informs me that he has seen a number of these cards and Bean was certainly generous with his duplicates. These cards were printed specially with a blank oblong at the bottom to take the particulars.

Acme lineata (Drap.) labelled "*Turbo fuscus* Scarboro".

Acanthinula aculeata (Müll.) labelled "*Helix spinulosa* Scarboro'."

Retinella pura (Alder), labelled "*Helix nitidula* Scarboro'."

Lymnæa glabra (Müll.) labelled "*Helix octanfracta* Scarboro'."

Vitrea crystallina (Müll.) labelled "*Helix crystallina* Scarboro'."

Vallonia costata (Müll.) labelled "*Helix crenella* Scarboro'."

Punctum pygmæum (Drap.) labelled "*Helix pygmæa* Scarboro'."

Vertigo pusilla Müll. labelled "*Helix turbo vertigo* Scarboro'."

Acanthinula lamellata (Jeff.) labelled "*Helix scarburgensis*".

Scarburgensis was Bean's MS. name and specimens were distributed by Bean under that name to various collectors including Alder, Kenyon, Miller, and Turton, the last giving it the MS. name of *holosericea*. Miller knew of this and sent examples under that name only to Jeffreys who, noting that they were not the true *holosericea*, described them as *lamellata* (3, p. 333), and this was published while Alder's paper describing it as *scarburgensis* was in the press (1, p. 36). Alder cites *holosericea* Turton in his synonymy, so he too knew of Turton's name. Apparently Jeffreys did not know of Bean's MS. name, since he does not cite it.

SPECIMENS ex J. S. MILLER.

Planorbis crista (Linné).
Theodoxus fluviatilis (Linné).

A series of each without locality, both mounted on trade cards of " J. S. Miller | 13 Hillsbridge Parade | Bristol ".

Sphærium rivicola (Lamk.). Two cards, one pair on each, labelled " Found by Mr. Miller in River Avon ". The original determination of *corneum* has been partially erased.

A card with shells labelled in Lyons' script, *Helix cochlicolla*, *H. holosericea*, *H. subrufescens*, and *Vertigo anglica*, the last are missing (two specimens). *Helix cochlicolla* is an error for *Helix cochlicella clavulus* Fér. =*Opeas pumilum* (Pfr.) and was first found by Miller. I have already dealt with the use of *holosericea* for *lamellata* and these specimens must have had the same history as Jeffreys' specimens, i.e. ex J. S. Miller ex Bean. *Subrufescens* (=*fusca* Mont. non Poiret) is Miller's own species. If my view is correct, these two specimens are paratypes, and so far as I know are the only extant specimens named by Miller, unless there are any in the Alder Collection at Newcastle. As to *anglica*, Jeffreys, in renaming this species *ringens*, stated that his specimens came from Miller (3, p. 356), though being Scarboro' specimens they were ex Bean ; Férussac's specimens also came from Bean. Thus the evidence is very clear that the specimens on this card came from Miller. The citation of Férussac's *nomen nudum* shows that these shells were sent after 1821, and *subrufescens* Miller was not described until 1822.

SPECIMENS ex THE REV. DR. GOODALL, PROVOST OF ETON.

Three cards bearing his script :—

Theodoxus fluviatilis (Linné). " Thames at Eton."

Vertigo pygmæa (Drap.). Eton, labelled " *Turbo 6-dentatus* ".

Azeca goodalli (Fér.). Amersham, labelled " *Turbo tridens* ", one specimen.

Amersham was the original locality from which Dr. Goodall obtained the specimens he sent to Férussac and then were described as *goodalli*. The use of *tridens* shows that this one was sent before 1821.

German " authorities " still persist in using *menkeanum* (C. Pfr.) for the trivial name. The facts are as follows : *Helix goodalli* Fér. was defined in his Prodrome, p. 65, issued in livr. 11, 13th July, 1821. C. Pfeiffer in his *Vorrede*, pp. 5–6, note, states that he had received livrs. 1–11, so his *Natur. Deutsch. Land und Susswasser Moll.*, part 1, is later, though the *Vorrede* is dated Fruhjahre 1821. Pfeiffer's examples were fossil.

SPECIMENS OF UNKNOWN ORIGIN WITH UNRECOGNIZED SCRIPT

Vitrea crystallina (Müll.), a nice series of all ages " Swaffham Prior Cambs." noted as " not described by Montagu ". These may have come from the Rev. L. Jenyns, who in 1831 was living at Swaffham Bulbeck. They certainly came from a most careful collector.

Six hexagonal cards with labels attached of specific names and no localities :—

Planorbis planorbis (Linné).
Planorbis albus Müll.
Clausilia rugosa (Drap.).
Laciniaria biplicata (Mont.).
Marpessa laminata (Mont.), two cards.

The *Clausiliæ* are all called *Turbo*, but this has been altered by Lyons to *Clausilia* and *rugosa* is labelled *nigricans*.

This series may have come from Rackett.

Jeffreys states, under *Clausilia labiata* (Mont.) = *solida* (Drap.): "I observed a specimen of this shell in the extensive collection of Mr. Lyons, of Tenby, who said it came from Hyde Park, near the Serpentine river" (3, p. 353), and later added, "Mr. Lyons informs me that his specimen was presented to him by Miss Pocock" (4, p. 513). This specimen was not in the collection and probably did not reach the Tenby Museum. Jeffreys also notes under *Helix globularis* Jeff. = *Monacha granulata* (Alder), "also at Tenby. Rev. Dr. Goodall" (4, p. 507). This species also was not represented and was not in the Lyons Collection when Jeffreys inspected it.

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CEPÆA NEMORALIS L. IN THE DARTRY MOUNTAINS.

By A. Comfort.

I was able in February, 1943, to visit the remote locality on Annacoona, in the Dartry Mountains, Co. Sligo, from which Welch and Stelfox originally reported one of those large western strains of *C. nemoralis*, apparently related to the extinct *C. tonnensis* Sandberger. The following observations are likely to be of interest in establishing the position of the Annacoona shells.

Site.

The Dartry plateau extends over an area of some thirty square miles in the seaward parts of the counties Sligo and Leitrim. It is a level and exposed table-land of limestone, surrounded almost completely by cliffs and divided up into individual mountains by deep glens. The various mountain-tops are almost entirely isolated from one another, as far as mollusca are concerned, by the extension of the peat, which occupies the entire central depression in the plateau, and from which only the summits of Truskinore (2,113 feet) and Benbulbin are entirely free, and out of which there project a number of small barrel-shaped crags, surrounded by areas of fallen cliff débris which is imperfectly grassed over. The southern slopes are covered with a dense mixed wood of hazel and birch, steep and overgrown with *Luzula*. The northern glens, Gleniff and Glenade, are grassy and the head of Gleniff is filled with moraine material deposited during the melting of a residual ice-pocket under the north face of Annacoona.

General Molluscan Fauna.

The woods on the south slopes contain numerous old woodland forms, including *Acanthinula lamellata*, *A. aculeata*, *Hygromia subrufescens*, *Arianta arbustorum*, and *Lauria anglica*. The colonies of *A. arbustorum* extend up the gully of the stream over the falls to a height of about 1,200 feet, where the woods end. Normal flattened *Trichia hispida* of a very deep red colour are common in these woods, and at the foot of Gleniff, near Ballaghnatrillick. *A. arbustorum* is also found in the cliff chimneys on the face of the ridge connecting Annacoona with Benwhiskin. Normal *Cepæa nemoralis* of the hedgerow form, chiefly the single-banded *rubella*, extend up Gleniff almost to its head among the piles of stones which have fallen from demolished cottages. The forms occurring on the talus below the large cave on the west side of Gleniff are more robust and are without periostracum by the time the lip is formed.

On the small projecting crags which rise out of the peat bog, living at an altitude of about 1,500 feet, there are colonies of *Clausilia rugosa*, *Lauria cylindracea*, *Oxychilus cellarium* (a small form, unlike the var. *hibernica* Kennard in the gullies on the Glencar side), and *Pyramidula rupestris* which is generally distributed all over the talus slopes. *Agriolimax* sp., *Arion ater*, and *A. circumscriptus* are also to be found on the top, on the piles of stones among the bogland. All the slopes, even where they are partially invaded with peat, are infested with a peculiar modified form of *T. hispida*, which is black, flat, hairless, much eroded apically in many cases, and totally unlike the valley shells.

The locality for the large *nemoralis* is situated at the extreme head of the right hand or Western branch of Gleniff, where a shepherds' path leaves the partially constructed quarry road on the north face of Annacoona. The summit on the west side of the col is separated from it by two ranks of cliffs, the lower small and grassy, and the upper arranged in an amphitheatre, filled with talus-material. The living and dead shells of the large form are found at the foot of these cliffs, and on the grass slopes behind them, extending in a westerly direction as far as the depression separating Annacoona from the Benbulbin plateau. The shells become progressively more normal as one goes westwards, the largest forms occurring on the Gleniff col itself, and becoming reduced in size as Annacoona is left. Other small colonies of the large form occur on the isolated groups of crags surrounded by bogland south of the main locality. There is a strong tendency to individuality among the shells of each isolated rock.

The aberrant shells collected on Annacoona seem to fall into four distinct categories. Intermediates are few, and all shells which I collected in the course of a morning resolve themselves fairly easily into one group or another.

(i) A very thick, heavy, and high form, $1\frac{3}{4}$ by $1\frac{3}{4}$ cms., with a more or less brown lip, very little periostracum during life, a contracted aperture, and the general form of *A. arbustorum*, so much so that in very old shells which had lost their colour only the form of the peristome enabled it to be distinguished from a heavy form of this species which occurs in the same locality. The specimens are nearly all of the var. *rubella*, though I took one of a brown banded yellow form.

(ii) A wide, large, strong form of the var. *rubella*, with a brown lip and a much puckered suture, $2\frac{1}{4}$ by $1\frac{3}{4}$ cm., entirely unlike the preceding in shape. The periostracum was usually in fairly good condition. The umbilicus was not patent. I found a few of the var. *albolabiata.*

(iii) A very large form $1\frac{3}{4}$ by $2\frac{1}{2}$ cm., yellow, bandless, with a white lip and widely patent umbilicus, even in adult shells, coarsely striated but glossy, with a thin sharp lip and a thick periostracum. This form I was able, by the kindness of A. W. Stelfox, to compare both with the other large Irish *nemoralis* and with *C. tonnensis* from Germany. It is taller than the latter, and the mouth is less oblique. The sculpture is also less regular. It differs radically from the Dog's Bay and Clare Island shells, which are far more porcellanous and less swollen, and from the large Inishmurray shells, which have the appearance of unusually well-nourished *nemoralis* of a normal shape. Its general texture is not at all unlike a light-coloured *Camæna cicatricosa*, but it is a clear lemon yellow. Living examples were not found, so I was unable to examine the dart. The shells are outnumbered by other forms, and though a good many occurred, only one was picked up in perfect condition. All the specimens were on or under the low cliffs facing east on to the Gleniff col.

(iv) There is also a thinnish brown bandless form, suggesting a hedgerow *nemoralis* which has weathered, and which I found alive further westwards above the new mines. These again seem an individual colony, possibly introduced from the valley with quarry material in recent times.

The habitat of the Annacoona shells is in the vegetation on inaccessible parts of the cliff. The living examples which were taken were buried in limestone scree, and almost all the shells showed one or more fractures usually of the last whorl, the commonest being a long crack running parallel with the suture.

There seems little doubt that in the Dartry shells we are dealing with a primitive form which has been isolated by the extension of the peat from outside genetic influences. The red forms are nearly all recognizable as *nemoralis* without difficulty, but the large yellow form is unlike any other Irish forms of the species. The var. *albolabiata* which is common at Bundoran has transparent bands and is often so depressed as to look from above like *Eobania vermiculata.* Further north in Donegal it is small, high, and bright lemon-coloured.

It might not be out of place to mention here another extreme variation of the same mollusc from the Mountbatten demesne at Mullaghmore, on the coast below Gleniff. Here, in a mossy wood of conifers and birches, which has been artificially planted to restrict the movement of sand, and which has been partially killed by a growth of sea-buckthorn, and upon a grass warren between it and the sea, I found a small, high, distorted, and very thick form, the mouth much contracted and often irregular, and the last whorl very much swollen. These peculiarly stunted shells make up a total of about 20 per cent among a normal sandhill population of *nemoralis.* They are confined to the back of the dunes, and do not occur nearer to the sea. Many of the remaining shells are higher and smaller than usual, but normal forms are in a majority. It was an extreme instance of this same deformity, which looks as if it were due to damage inflicted on the growing mantle edge by rolling down the slopes, which was shown to the Society some years back as a *Streptaxis*, by way of a joke, and which passed unrecognized. In the woods which survive, *Helicella itala* (a large form without bands and a distinct small banded form) and *Lauria anglica* occur together, and it is just conceivable that these small forms are the survivors of a woodland population which have reacted abnormally to the arrival of the sand.

I am much indebted to A. W. Stelfox for his specimens of Irish *nemoralis*, and for a detailed account of his original Annacoona locality.

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JOSEPH WILCOCK AND HIS "ILLUSTRATIONS OF OUR BRITISH UNIONIDÆ".

By E. G. BAYFORD, F.R.E.S., and N. F. McMILLAN.

SOME years ago Mr. Tomlin showed one of us a number of rather crude wood-engravings of Anodons which apparently belonged to a hitherto unknown work on British Unionidæ. The plates were accompanied by a note in the handwriting of Fred Rhodes, "List of Woodcuts by Joseph Wilcock sent to me by Geo. Roberts of Lofthouse in 1887. F. Rhodes."

Attempts were made to find out more about the book and its author (if indeed the book had ever been published at all), but it was not mentioned in the Catalogue of the Library of the British Museum (Nat. Hist.), nor was it included in any bibliography nor in the *Zool. Rec.* However, George Roberts reviewed (*Sci. Gossip*, 1888, p. 115) "Illustrations of our British Unionidæ" by Joseph Wilcock of Wakefield, and to this book Mr. Tomlin's fifteen plates appeared to belong. In the following paper we have collected all the information we could obtain concerning this rare book.

PART I. "ILLUSTRATIONS OF OUR BRITISH UNIONIDÆ."

By N. F. McMillan.

There is a copy of Wilcock's book in the Skidmore Collection in the Public Library of Wakefield, and some years ago by the great kindness of Mr. G. H. Wood, F.L.A., the City Librarian, Wakefield, I was enabled to examine it at my leisure.

The book is in 8vo of 46 folios printed on one side only, and in its bound state contains 46 pp. of text and 105 rather crude uncoloured woodcuts of Unios and Anodons. The title-page reads: "ILLUSTRATIONS | of | OUR BRITISH UNIONIDÆ, | comprising | FULL-SIZE ORIGINAL WOOD ENGRAVINGS OF | THEIR TYPES AND VARIETIES | by JOSEPH WILCOCK. | AUTOGRAPH COPY—Only Twelve Printed | WAKEFIELD. | PRINTED AND PUBLISHED BY J. WILCOCK, PINCHEON STREET. | 1888."

A pasted-in photograph of Wilcock forms the frontispiece, an elderly bearded man seated at a table occupied with book, pen, and ink, while before him lie a couple of his beloved Anodons. The photograph is by W. Webster, and Wilcock has autographed it. Mr. Bayford says it is an excellent likeness.

The dedication is "To the Conchologists of Great Britain", and in the preface is acknowledged the assistance of G. Roberts, W. Webster, J. A. Hargreaves, H. T. Soppitt, F. Rhodes, W. Nelson—[J. R. B.] Masefield, R. Standen, G. S. Tye, Miss Fairbrass, C. Oldham, T. D. A. Cockerell, F. G. Fenn, H. Richardson, and others. The preface is dated from "Pincheon Street, Wakefield, March 25th. 1888". Next comes the Introduction (pp. vii–xlvi) with seventeen text-figs. to illustrate the confusion which has existed with regard to type-forms. The rest of the book is made up of the 105 wood-engravings. These are not numbered in print, but in the corner of approximately every alternate plate is a pencilled number, these numbers running from 1 to 56. In some cases the unnumbered plate which should come between two numbered ones is missing, and two numbered plates immediately succeed each other. There are also three unnamed plates. Twenty-nine new varieties and four monstrosities are figured but not described.

In his Preface Wilcock states " In the present preliminary work (of which only a small edition has been printed) . . .", and on p. xlii he also states " In my next issue . . .", but the projected revised edition does not appear ever to have been published, though Roberts evidently knew of its proposed existence, for in his review he alludes to " The second and revised edition, which may number one hundred copies, is designed to contain short descriptions, together with exact localities for each form illustrated ".

In Charles A. Federer's " Catalogue of the Library of Wakefield Books in the possession of Charles Skidmore . . . " (privately printed 1897) Wilcock's " Illusts."—autograph copy—is duly listed, and in addition an " ordinary copy " of 6 pp. and 15 plates. Of the latter no copy seems to have survived, and although the Skidmore library is now in the Public Library, Wakefield, the " ordinary copy " mentioned above is not now to be found (Feb., 1942, *fide* R. C. Sayell, City Librarian).

Comparison of Mr. Tomlin's plates with those in the Wakefield book shows that only one of them occurs in Wilcock's book, although the general style is unmistakably the same. Evidently these woodcuts are in the nature of preliminary " pulls " or trials. Indeed Mr. Tomlin tells me that he has heard that Wilcock was in the habit of giving trial proofs of his conchological plates to his friends, and Roberts advertised such woodcuts in the exchange columns of *Science Gossip*. I believe Mr. Tomlin's plates are those exhibited by Fred Rhodes at a meeting of the Conchological Society in 1925 (see *Journ. Conch.*, xviii, p. 27, 1926).

Mr. A. S. Kennard also possesses ten of Wilcock's woodcuts of Anodons, enclosed in thick blue paper such as might have been used if issued as parts. These woodcuts were exhibited to the Malacological Society, May, 1941 (*Proc. Malacological Soc.*, xxiv, 169, 1942).

A collection of seventy-nine Wilcock plates was presented to the Library of the Conchological Society (*Journ. Conch.*, xxi, 29, 1938) by Mr. H. H. Bloomer, who had previously lent them to me for examination. These plates had come from the Standen Collection; thirty-two have printed titles (fourteen appearing in the Wakefield copy of the " Illusts."), thirty-three are labelled in an angular hand (not Wilcock's), and nine in a rounded handwriting, author unknown, but not either Standen's or Rhodes' (*fide* Dr. J. W. Jackson). But the most interesting point is that one of the cuts has been done on the back of what appears to be page 6 (text) of either the " lost " " ordinary edition " of the " Illusts.", or else of the projected second edition. This page, describing two varieties and six monstrosities of *Unio tumidus*, does not appear in the Wakefield copy of the " Illusts." (autograph edition).

Wilcock stated that twelve copies only were printed of the *Illusts.* and of these I have been able to trace but two. One is that in the Skidmore Collection in the Public Library, Wakefield, and the other is in the possession of Mr. E. R. Sykes who obtained it some twenty-five years ago.

I am indebted to Mr. Kennard for the information that a third copy was in the P. B. Mason Library, which was bought by Bailey Bros. of Newington Butts. This copy was seen by Reynell, though he did not purchase it, and its present whereabouts are unknown.

Wilcock also published three little lists of British land and freshwater shells as under :—

A. " Exchange List of British Land and Freshwater Shells, With all the latest Named Varieties in full, Revised and Corrected up to the end of December 1866 ; Compiled from the Works of Eminent Authors by JOSEPH WILCOCK, Wakefield."

This is a single sheet of names only. In a footnote is " Price 2d. each . . . mounted on Calico in a neat Case suitable for the pocket 6d. each. May be had of Joseph Wilcock, Arundel Street, Wakefield ". There is a copy in the Library of the Conchological Society.

B. " A Catalogue of British Land and Freshwater Shells, compiled from Vol. I of British Conchology, with Additions to the present Time." Wakefield, J. Wilcock, 1868, 24mo, 16 pp.

This is listed in Federer's Catalogue of Wakefield books, already mentioned. I have not seen a copy, but it sounds suspiciously like an earlier edition of the next item. Reprinted 1872—see Mr. Bayford's account of Wilcock.

C. " A Catalogue of British Land and Freshwater Shells : compiled from Vol. I and Supplement Vol. V of ' British Conchology '." By Joseph Wilcock. Price Two-Pence.

My copy is imperfect, and the title-page is missing, but the covers are intact. No date on the cover, but it must be post-1869. 14 pp.

Wilcock was not, I think, ever a member of the Conchological Society, and his name is only mentioned twice in the *Journal* (vol. iii, p. 327, and vol. xi, p. 108). His collection of shells was rescued from oblivion in a second-hand dealer's shop by Mr. B. Bryan ; the shells were mounted on glass and bore no data. Mr. Bryan also acquired the slug-models that Wilcock carved and sometimes coloured.

PART II. JOSEPH WILCOCK.

By E. G. Bayford, F.R.E.S.

Amongst the many students of nature with whom it has been my good fortune to become acquainted during the last sixty years Joseph Wilcock remains an outstanding figure. Our introduction came about in the following manner. In the summer of 1883 I joined the Barnsley Naturalists' Society, and commenced the study of beetles. The following spring, by invitation of the local society, the Annual Meeting of the Yorkshire Naturalists' Union was held in Barnsley, and in honour of the occasion an exhibition of natural history was arranged in the largest of our public buildings and continued throughout the week. Amongst the exhibitors was Joseph Wilcock of Wakefield, who brought his collections of beetles, shells, and carved models of slugs. Naturally we were very soon on terms of intimacy. Until then I had not seen so many species together, and spent most of my leisure time during the week in closely examining them. Of the shells I remember little except the many fine specimens of *Anodonta* and *Unio*, but the carvings of slugs in both extended and retracted positions excited my admiration, their markings, wrinkles, form, and colouring were reproduced so exactly as to render them lifelike. Through all the years I still retain a vivid picture of them in my mind. Soon after this I removed to Wakefield and quickly renewed our friendship. I visited him at his home, where I sensed that naturalists were looked upon with disfavour by his wife who, evidently, felt that Natural History took her husband too much from the serious business of life, the daily pursuit of bread and butter. At this time he had left Northgate and removed his presses to the upper rooms of a three-storied house at the corner of Pincheon Street. Here, away from the discord and elements below, we were able to talk about beetles and examine them to our hearts' content. As my stay in Wakefield came to an end with the year I had not many opportunities for fieldwork with him, but I saw sufficient of his keenness and zeal to make a lasting impression. He was a loyal member of the Wakefield Naturalists' Society which numbered amongst its members prominent men like J. Wainwright, Gerrard (H.M.I. of Mines), G. Parkin, etc. For the man himself, the portrait prefixed to his *Unionidæ* is an excellent likeness, and the imagination can picture its original as a man of average height, of medium build, clad in black, with a frockcoat (I never saw him in anything else except when in his shirtsleeves when at work), and when outdoors wearing a flat-topped felt hat, narrowing slightly from brim to crown (never seen nowadays), he is before you. As a printer he was a good craftsman, and I have seen many fine specimens of his work. For his collections he made his own cases, lined and glazed them, and printed his own labels In 1868 he printed " A Catalogue of British Land and Freshwater Shells ", a little work of 16 pp., 24 mo. This was reprinted in 1872. The advertisement of it is printed from the same forme which was used for printing the front cover and appeared on the inside covers of the April, May, June, July, and August, 1873, issues of the *Yorkshire Naturalists' Recorder*, a short-lived magazine (July, 1872, to August, 1873) of which he was the printer. His most important work, " Illustrations of our British Unionidæ," is a good example of a book produced single-handed. He collected the specimens, wrote the descriptions, drew the illustrations, 105 in number, carved the blocks, and printed off the work. The only part he did not play was the taking of his photograph. It may have been in connection with this work that the following story is told. I heard it from the principal concerned in the affair. Being in need of suitable wood for blocks and being at the same time short of the wherewithal to purchase it, he mentioned his sad plight to some of his fellow members. One of them, whose beautiful and secluded garden was near Kirkgate Station, at once told him that he was about to cut down one of his trees (an old crab-apple if I remember aright) and he was welcome to it. The poor fellow's difficulty was removed by this prompt and happy intervention of his friend. The Conchological Section of the Yorkshire Naturalists' Union was founded 2nd December, 1876, and William Nelson, of Leeds, and Joseph Wilcock, of Wakefield, were elected as the nucleus of a committee. I cannot find that he continued his connection, as a member, with the Union, but when Nelson and J. W. Taylor commenced publications in the *Trans. Y.N.U.* of an "Annotated list of the Land and Freshwater Mollusca known to inhabit Yorkshire" Wilcock's records were placed at their disposal. This list was never completed, the portion published consists of :—

Part I. 1877. pp. 1–16. *Sphærium, Pisidium, Unio, Anodonta.*
Part II. 1880 (publ. 1883), pp. 17–32. *Dreissena, Neritina, Paludina, Bythinia, Valvata.*
Part III. 1883 (publ. 1885), pp. 33–48. *Planorbis.*
Part IV 1884 (publ. 1886), pp. 49–64. *Physa, Limnæa* (part).
Part V. 1890 (publ. 1891), pp. 65–80. *Limnæa.*

In the years that followed my removal from Wakefield I was flitting from place to place in Yorkshire and Lancashire, eventually returning to Barnsley in 1892. I had lost touch with most of the old friends, but now commenced to seek them out. Joseph Wilcock was dead, but his collection of beetles, badly cared for, many of them mouldy, or masses of frass, were stored for disposal, and more for old times' sake than for any value they had, passed into my possession. Amongst them was a specimen of *Broscus cephalotes* labelled "Wakefield" with a date. Now this predatory species is almost wholly a frequenter of the sea coast where it is very common, under heaps of seaweed left at high water. Its only recorded occurrence inland, at Cannock Chase, was looked upon as having been imported with sea sand by a returning tripper, and I accounted for the Wakefield specimen in the same way. Since then the late Dr. Corbett discovered it well established at Rossington golf-links near Doncaster, so that there is some justification for thinking that both the Cannock Chase and Wakefield specimens may after all have been indigenous to the locality. In this attempt to recollect Joseph Wilcock's services to science there is much that has no direct connection with conchology, but as he combined that study with coleoptera it was not for me to separate them.

He was a fine example of the working-man naturalist, of whom so many were to be found in Lancashire and Yorkshire during the last century. It is fitting that his pioneer work should receive its just recognition.

THE MOLLUSCA OF LEYBURN AND DISTRICT.

By Ralph H. Lowe.

The area covered by the survey is shown on 1 in. Ordnance Map Sheet 27, and extends from Ulshaw Bridge, about three miles to the east of Leyburn, to Aysgarth Bridge, and deals only with the north bank of the River Yore between those two limits. Besides the market town of Leyburn, the following villages come within the area: Spennithorne, Harmby, Wensley, Preston-under-Scar, Redmire, Castle-Bolton, and Carperby. The countryside is almost entirely mountain limestone which outcrops at the top of the dale side to give such escarpments as Leyburn Shawl, Preston Scar, and Redmire Scar. Above the scars comes the millstone grit, with its negligible molluscan fauna. Woodland areas are extensive and are fairly productive, though not so rich as the scars and the accompanying screes. There is an abundance of moorland streams making their way to the Yore, but ponds are very few, and the freshwater fauna is comparatively poor. The roads and fields are in many places bounded by loose stone walls which have a rich yield, whilst the hedge sides too are most productive in places—at any rate in number of specimens if not in variety of species.

The following is a list of species taken, with notes of observations I have made :—

Limax maximus Müller.—General. Under screes and bark of trees.

Limax maximus var. *cinereo-niger* Wolf.—One specimen on a fir tree on Redmire Scar.

Limax flavus Linné.—Near houses and gardens in Spennithorne, Wensley, and Redmire.

Limax arborum Bouchard-Chantereaux.—Leyburn Shawl, Bolton Gill, Redmire Scar, Preston Scar, Bolton Hall Woods.

Agriolimax agrestis Linné.—Common.

Agriolimax lævis Müller.—Harmby Old Lane.

Vitrina pellucida Müller.—Common.

Vitrea crystallina Müller.—Common.

Oxychilus cellarium Müller.—Common.

Oxychilus alliarium Miller.—Common.

Retinella nitidula Draparnaud.—Common throughout the area.

Retinella radiatula Alder.—My only record is for Bolton Gill.

Euconulus fulvus Müller.—To be found sparingly everywhere.

Arion ater Linné.—Common. The only variety met with was var. *aterrima*.

Arion subfuscus Draparnaud.—Quarry Road, Redmire.

Arion intermedius Normand.—Castle Bolton, Redmire Scar.

Arion hortensis Férussac.—Found in most localities, near gardens and buildings.

Arion circumscriptus Johnston.—Bolton Hall Woods, Bolton Gill Wood, Preston Scar, etc.

Punctum pygmæum Draparnaud.—Scarth Nick Road and near Aysgarth Station.

Goniodiscus rotundatus Müller.—Common in all types of locality.

Vertigo pusilla Müller.—Wall near Aysgarth Station.

Pyramidula rupestris Draparnaud.—Scattered throughout the district.

Vallonia costata Müller.—On a wall at the top of Leyburn Shawl.

Vallonia excentrica Sterki.—A few specimens on Bob Scar.

Helicella itala Linné.—Two localities only—Harmby and Preston Scar.

Ashfordia granulata Alder.—Bolton Gill, Bolton Hall Woods, Spennithorne Wood.

Trichia hispida Linné.—Common in woods and hedges and under screes.

Trichia striolata C. Pfeiffer.—The commonest mollusc in the area. It abounds especially in woods and by roadsides, and varies in colour from var. *alba* to var. *rubens*. Var. *albocincta* is common.

Helicigona lapicida Linné.—After rain this species can be seen in large numbers on most roadside walls in the neighbourhood. The only variation noted has been one specimen of var. *ecarinata.* I have been puzzled by its abundance in Wensleydale and other Yorkshire dales, yet it is absent in Teesdale and the whole of Northumberland and Durham. Is it that it has been able to make its way up all the tributaries of the Ouse basin but has been unable to cross the watershed between Swaledale and Teesdale ?

Arianta arbustorum Linné.—Commoner in the western part of the area. Present in Bolton Hall Woods, Bolton Gill—sparingly along the scars—along the Scarth Nick Road—near West Bolton. The best locality I have found is the Redmire Quarry Road. Varieties taken here include *alpicola*, *fuscescens*, *flavescens*, and *cincta.* Whilst odd specimens can be taken on most of the roadsides west of Wensley few can be found east of that.

Helix aspersa Müller.—This has been taken on the garden walls of every village in the area, but I have yet to see it in any other place. According to Boycott it is unknown inland in the north of England except in humanized habitats. In the villages it does not range beyond the immediate environs. I have noted little in the way of variations.

Cepæa nemoralis Linné.—Abundant above 800 feet, i.e. along the scars and higher roads. It varies greatly, and var. *albolabris* is not uncommon. I have about six specimens of var. *albolabris* plus *lateritia* and other varieties include *hyalozonata*, *undulata*, *fascialba*, *acuminata*, and *planospira.* The ground colours are two only, yellow and pink. Band formulæ vary greatly and include 12345—(123)(45)—(12345)—1(23)(45)—00300—00305—10345—00000—120(45)—00345—023(45) and (12)3(45). Except in one locality no colony has any dominant characteristics and the most varied specimens live closely together. Var. *albolabris* can always be taken at the roadside at Scarth Nick, whilst *albolabris* plus *lateritia* is at the bottom of the hill on the same road, the only locality I know. East of Leyburn the land sinks below 800 feet and I have no records for *Cepæa nemoralis* between Leyburn and Ulshaw Bridge.

Cepæa hortensis Müller.—Common along hedges and roadsides and along the riverside at Pass Wood. It is common too along parts of the railway embankments. In woods it is rare, except for one locality in Bolton Gill, where a colony on rose-bay willow herb has var. *ludoviciana.* The ground colour is always yellow and band formulæ vary little, being chiefly 00000—12345—(123)(45)—(12345)—and 10345. The interesting point about *Cepæa hortensis* is that it is rare or non-existent above 800 feet, at which point *Cepæa nemoralis*, which is rare below 800 feet, seems to take charge. Along the Scarth Nick Road, *Cepæa hortensis* is common until the 800 feet mark is reached, when it suddenly dies out, and from that point *Cepæa nemoralis* is abundant. In Bolton Gill, almost exactly on the 800 feet line, *Cepæa hortensis* and *Cepæa nemoralis* are found together. Above that are no *Cepæa hortensis*, below are no *Cepæa nemoralis.* A small variety of *Cepæa hortensis* is to be found on the road between Scarth Nick and Preston Lane End.

Ena obscura Müller.—Fairly common on walls and scars.

Cochlicopa lubrica Müller.—Scattered throughout the district.

Azeca goodalli Férussac.—Bolton Gill, Scarth Nick, Pass Wood.

Abida secale Draparnaud.—One specimen (alive) taken on a scar on Carperby Moor.

Lauria cylindracea Da Costa.—Common on scars, on walls, etc.

Pupilla muscorum Linné.—Harmby Old Lane.

Balea perversa Linné.—This species is very common on walls in the lower parts of the valley. It becomes scarcer in the higher levels and while they can be gathered in their hundreds at heights up to 600 feet, the walls, scars, and screes above that level yield very few.

Marpessa laminata Montagu.—Well scattered and common under bark wherever branches are to be found. Height seems to make no difference to it, e.g. Bolton Hall (under 400 feet) ; Redmire Scars (over 1,000 feet).

Clausilia rugosa Draparnaud.—Everywhere common in all types of locality.

Clausilia cravenensis Taylor.—This species is especially abundant along the scars, where it sometimes reaches a large size. I have taken it along the whole limestone outcrop from Leyburn Shawl to Carperby Moor. Other localities are Harmby (dry wall) ; Pass Wood (under logs) ; Bolton Hall (mossy wall).

Succinea pfeifferi Rossmässler.—Harmby Old Lane.

Carychium minimum Müller.—In woodlands—Bolton Hall, Bolton Gill, Harmby.

Ancylastrum fluviatile Müller.—Spennithorne and Harmby Becks ; River Yore ; Bolton Gill ; Beldon Beck.

Lymnæa peregra Müller.—Common in Spennithorne and Harmby Becks. Spennithorne brick-pond. A small variety lives in a tricklet in Bolton Gill.

Lymnæa palustris Müller.—Spennithorne brickpond.

Lymnæa truncatula Müller.—Spennithorne water meadows—Spennithorne brickpond.

Planorbis carinatus Müller.—Spennithorne brickpond—Spennithorne water meadows.

Planorbis spirorbis Linné.—Spennithorne water meadows.

Aplecta hypnorum Linné.—Spennithorne water meadows.

Anodonta cygnea Linné.—I have found many dead valves among river detritus, but I have been unable to obtain live specimens in this stretch of the River Yore.

Sphærium corneum Linné.—In quiet parts of the River Yore in several places.

Sphærium lacustre Müller.—Spennithorne brickpond.

In addition to the foregoing there are one or two species of *Pisidium* which I have not yet been able to identify.

These records are as full as I have been able to make them. With the help of my wife I have spent over a year searching this part of the dale. Nevertheless I make no claim to completeness. The area is large and I am by no means satisfied with my finds of some of the smaller species, e.g. *Vallonia* and *Vertigo*, which ought to be more frequent than my records show. Nor have I come across *Acicula lineata* which ought to be in this area, *Pomatias elegans*, *Acanthinula aculeata*, *Cecilioides acicula*, and *Theba cantiana*. But my most surprising observation is that *Helicella* is almost entirely absent. I know of two places where *Helicella itala* has a precarious hold, but nowhere have I seen a single specimen of *Helicella virgata*, *caperata*, or *heripensis*. I have no idea of why that should be as the area offers what seem to be perfect habitats.

I have worked different types of localities without knowing of any previous records, so that I have started with a clean sheet and what records I give have not been made through guidance. There are, no doubt, species recorded for some of these localities which do not appear on my list, and I should be glad to know what they are as it would be interesting to go back and try to find them.

LYMNÆA PALUSTRIS MÜLL. IN CAPTIVITY.

By Walter E. Collinge, D.Sc.

Replying to Mr. A. W. Stelfox's [1] note respecting mine on the gradual dying out of a colony of *Lymnæa palustris* Müll., I am not at all certain that the conclusion I arrived at is the correct one. I may be quite wrong and should warmly welcome any other explanation that Mr. Stelfox can offer based on his own experiments on other species.

At the time of writing I was thinking of the well known experiments of Ritzema-Bos on rats and those of Weismann on mice, not forgetting, however, that Castle's experiments on *Drosophila* produced an entirely opposite result, I called to mind that Marshall [2] had stated " that interbreeding may result in a reduced vitality " and " that a tendency towards sterility is often associated with a constitutional loss of vigour ". I also had before me Calkin's [3] statement that " there is some evidence that conjugation does not result in rejuvenescence when both gametes have lived for a long time in the same medium, so that their chemical composition is too similar ".

The Mendelian point of view has been tersely stated by Walter,[4] who writes : " The consequence of inbreeding as shown by the working of Mendelian laws is that latent or recessive characters tend to become homozygous and so brought to the surface, while outcrossing brings about the formation of heterozygous traits which mask recessive characters and render them ineffective."

Finally, bearing in mind the above opinions, I dissected specimens that were born early in 1935 and 1936 when they were just over twelve months old and in some of these I found that the generative organs had atrophied and in others they were only imperfectly developed, thus, rightly or wrongly, I formed the opinion " as the result of interbreeding over a period of thirteen years that the function of reproduction had gradually degenerated and died out ".

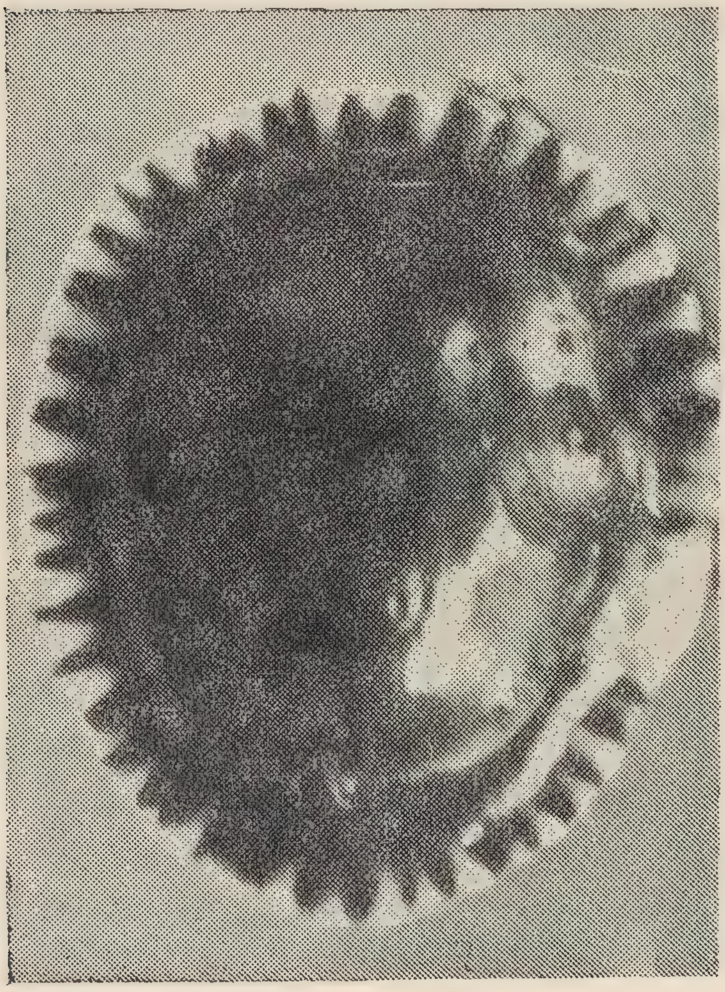
[1] *Journ. of Conch.*, 1943, xxii, p. 72.
[2] *Physiol. of Reproduction*, 1910, p. 601.
[3] *Journ. Exp. Zool.*, 1904, i.
[4] *Genetics*, 1913, p. 242.

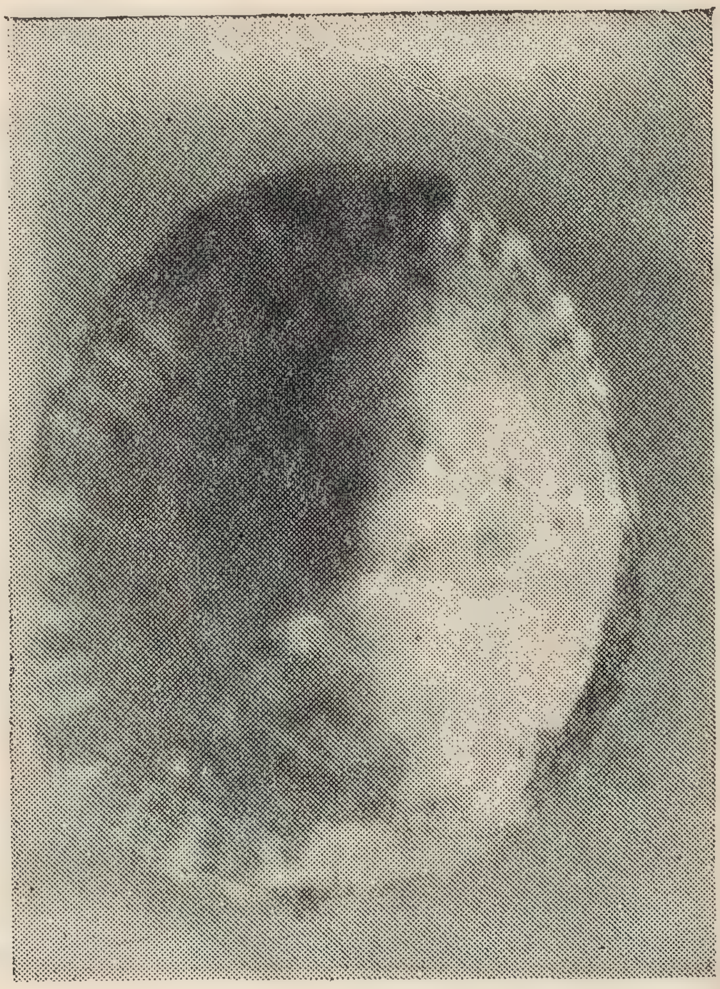
NEW SOUTH AFRICAN *SIPHONARIA*.

By J. R. LE B. TOMLIN.

SIPHONARIA ANNEÆ n.sp.

SHELL dark, small, solid, depressed, unusually regular and rounded, the siphonal groove being slight and shallow; apex practically central; exterior with numerous, rather slight, radiating white ribs; interior yellow-brown above, changing to a band of darker colour below, while the basal margin is whitish with numerous dark brown riblets regularly spaced, of which the holotype has about forty-two; in form it most resembles *S. oculus* Krauss, but that species is larger, more elevated, more elongate and irregular in shape, much more strongly ribbed, and the apex is not central and slopes decidedly to one side.





Diam. max.	.	15 mm.
,, min.	.	13 ,,
Alt.	. .	5·5 ,,

Hab. Umpangazi, May, 1939 (Professor and Mrs. Stephenson). It also occurs in the Isipingo district—a smaller race, with a whitish area inside and fewer riblets on the inner margin.

The species is dedicated to Mrs. Stephenson, and the following note on it comes from Professor Stephenson:—

"This species was first collected by us in the Isipingo district in 1935–6, and noted as a peculiar form in some ways similar to *Siphonaria oculus*. After comparing the Isipingo material with hundreds of *Siphonaria* shells collected from all round the South African coast (and including a wide range of varieties of *S. oculus*), we concluded that *S. anneæ* must be a species distinct from any of the other common South African forms.

Accordingly, on revisiting Natal in 1939 and 1940 we looked out for it particularly and found it to be locally common at Isipingo and Umhlali, and present also at Umpangazi. At the two former places it occurs along with other species, often in groups of a considerable number of specimens together, and seems to be readily distinguishable, and consistently smaller than the other species with which it associates. It has a tendency to occur on fairly smooth flat rocks inshore."

TWO MALAY *GEORISSA.*

By J. R. LE B. TOMLIN.

In the *Proc. Zool. Soc. London*, 1879, pp. 739, 740, plate 59, Godwin-Austen and Geoffrey Nevill described and figured two kinds of *Georissa* from Perak. About the identification of the former species, *G. monterosatiana* (fig. 6), I do not think there can be any doubt, though Godwin-Austen's drawing is as usual unsatisfactory; the shell has very regular, close, spiral scaly ribs which seem to be easily abraded.

In the paper cited above, Nevill says of his colleague's figure—" the last whorl but one should be considerably more convex and consequently less turreted and less conspicuous: the base of the last whorl is a shade too convex, giving the shell an umbilicate appearance which it does not possess."

This species was taken in Kelantan by the Skeat Expedition and has been sent to me in abundance by the Raffles Museum from Bukit Chintamani, Pahang.

Of the other species, *G. semisculpta*, the authors admit that they had only a single half specimen from Buket Pondong cave in Perak, but they boldly describe and figure the fragment. Nevill says that it is so conspicuously distinct " that I have not hesitated to describe it, though I do not usually do so when I possess only a unique specimen ".

Mixed with the *G. monterosatiana* from Bukit Chintamani was another abundant species which I identify as their *semisculpta*. Fresh specimens are of a warm red colour and have fine raised spiral ribs which are distantly and somewhat irregularly spaced and vary a good deal in degree. The suture is deeper than in *monterosatiana*. The sculpture is very fugitive.

Theba cantiana new to Staffordshire.—In June last I found a small colony of *T. cantiana* at Cheddleton, a village about three miles from Leek, North Staffs. They were on the slopes of a recently made embankment, among nettles, coltsfoot, dandelions, etc., in association with *C. nemoralis*, and were fairly numerous for a distance of several yards.

I paid another visit to the locality recently and they seemed to have diminished in numbers since I first found them in June. I think mice or voles had been active.

W. HILL.

Urocoptis dubia Chitty.—The eggs of above Jamaican species are globular, about 2 mm. in diameter, and have a comparatively substantial light-brown calcareous shell. The colouration is perhaps merely staining from decaying matter. The eggs, up to about half a dozen in number, are carried in the uppermost remaining whorls adjoining the septum which seals the opening caused by decollation. Possibly this remote position accounts for the few observations which have been made on the eggs of the group.

G. C. SPENCE.

(*Read before the Society, 10th April,* 1943.)

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN AND IRELAND.

670th Meeting (Annual), held at the British Museum (Nat. Hist.), 8th October, 1943.

Mr. A. S. Kennard, Vice-President, in the chair.

Present: (Members) Messrs. Ellis, Salisbury, Spence, Winckworth, Comfort, Dr. Hopwood, Lt.-Col. Peile, Col. Bensley, and Hon. Secretary. (Visitor) Dr. Cox.

Member Elected (for 1944).

George Henry Richards, F.G.S., 22 Priory Avenue, Hastings, Sussex.

Members Deceased.

Alfred Sich, Professor W. M. Tattersall, and Dr. C. Price-Jones.

Annual Reports.

The annual report of the Council, and the reports of the Yorkshire and North Staffordshire branches were presented and adopted. The Hon. Treasurer presented a report on the financial position of the Society.

Officers and Council.

Mr. A. E. Salisbury was unanimously elected President and took over the duty of chairman.

The other Officers, Council, and Auditors last in office were re-elected.

Votes of thanks to the retiring President, Dr. H. E. Quick, to the Manchester Museum, and to the British Museum (Nat. Hist.) were passed.

Short Papers.

The Hon. Secretary read abstracts from letters from W. Hill recording *Theba cantiana* (Mont.) from Cheddleton (new to Staffs, V.C. 39); from L. B. Langmead recording *Limax tenellus* (Müll.) from Hawkenbury, near Tunbridge Wells (new to Kent, West, V.C. 16); from C. D. Heginbothom recording *Valvata cristata* Müll. from Kennet and Avon Canal storage ponds at Caen Hill, Devizes (new to Wilts. N., V.C. 7), *Planorbis nautileus* (L.) from Heron Bridge, Potterne (new to Wilts. S., V.C. 8), and the same species from Bowood Lake, near Calne, coll. Dr. C. J. C. Siggers, 1942 (new to Wilts. N, V.C. 7); and from Fred Taylor recording *Trochulus striolatus* (C. Pfeiffer) m. *sinistrorsum* from Chipstead, Surrey, September, 1943.

Exhibits.

By Mr. A. G. Stubbs (per Hon. Secretary): *Cepæa hortensis* (Müll.) vars. *olivacea* (light, medium, and dark), *lutea*, *lurida*, and (123,45); also *Arianta arbustorum* (L.) from Heytesbury, Wilts.

By Mr. A. Comfort: Many interesting land shells from various localities in Eire.

By Dr. J. W. Jackson: Copy of *The Conchologist's Companion*, 1824, by Mary Roberts.

ANNUAL REPORT.

This is the Sixty-Seventh Annual Report of the Society. Since the last Annual Meeting the Society has lost three members by death, namely Alfred Sich, Professor W. M. Tattersall, and Dr. Price-Jones, and one new member has been elected.

One Ordinary Meeting was held at the Manchester Museum on the 10th April last and was fairly well attended with many exhibits.

Since the last Annual Meeting held in London on the 27th February, 1943, one number of the *Journal* has been issued, viz. vol. 22, no. 2, 29th July, 1943.

The Council is pleased to note that some of our members are occupying important positions in other societies, namely Professor H. L. Hawkins, D.Sc., F.R.S., is the President of the Palæontographical Society; he retired from the office of President of the Geological Society on the 17th March last; Dr. A. T. Hopwood is the President of the Malacological Society; and Dr. J. W. Jackson is the

President of the North-Western Federation of Museums and Art Galleries and of the Lancashire and Cheshire Fauna Committee. Mr. A. K. Lawson continues to carry out important duties as the Hon. Secretary and Treasurer of the latter body.

Several new records have been received. These include *Theba cantiana*, Staffordshire (39), W. Hill ; and *Limax tenellus*, Kent West (16), L. B. Langmead.

EDITORIAL NOTES.

We regret to announce the death of Miss Jessie D. Robertson. She joined the Society in 1921 and was a constant attendant at the meetings of the London Branch. She collected largely in England and also in the South of France, and her duplicates were given freely to the members whilst her genial presence was an asset at the meetings. She bequeathed her collection to the Freemason's School at Bushey and her collection of shell snuff-boxes to individual members of the London Branch.

A. S. Kennard.

About twenty-five years ago Mr. J. M. Williams, of Liverpool, gave me a few details about a nineteenth century Liverpool conchologist named Keen, who belonged to Marrat's generation and after whom Marrat named *Marginella keenii*.[1] He was partner in the firm Frodsham and Keen, of South Castle Street, makers of chronometers and nautical instruments to the Admiralty. Keen was also a friend of the Rev. H. H. Higgins, and they both had rather good collections. He died early in the 80's, and his collection passed into Sowerby's hands.

A name that occurs not infrequently in the early monographs of the *Conchologia Iconica* is that of Metcalfe ; his collection must have contained a number of types, and he occasionally described new species himself, for example, " An enumeration of Species of Recent Shells received by W. J. Hamilton, Esq., from Borneo in Nov. 1850, with descriptions of the new Species," *Pr. Zool. Soc. London*, 1851, pp. 70–4.

William was his Christian name and he was the second son of Charles Metcalfe, who was a J.P. for the Isle of Ely.

He was at school at Norwich under the famous Dr. Valpy, went to St. John's College, Cambridge, in 1823, and graduated as third wrangler in 1826. He became a Fellow of his College, was called to the bar in 1829, and had an extensive practice in the Chancery Courts. Failing health forced him to retire in 1855 and he went to live at Woodleigh Vale, St. Marychurch, where he died on 5th March, 1874.

Present members of the family are quite unable to say definitely what happened to his collection, but it was probably sold at Stevens' some years before his death.

Species were named after him in the genera *Conus*, *Marginella*, *Helix*, *Fissurella*, *Modiola*, *Triphoris*, *Parthenia*, *Pleurotoma*, and quite possibly others.

A member of this Society who passed out almost unnoticed twenty years ago was Dr. Henry Keyes Jordan, of Newport, Mon.

Born at Bristol in 1838 he spent some years in London as articled pupil with an engineering firm and by degrees became a specialist in coal mining, especially in the Forest of Dean and in South Wales where many pits were sunk under his guidance. He was a recognized authority upon the correlation of the coal seams in South Wales. In 1873 he became a member of the S. Wales Institute of Engineers and contributed many papers to its *Proceedings* on the geology of the S. Wales coalfield.

For one of these papers he received the first gold medal ever awarded by the Institute, and in 1920 was made an Honorary Member. He was elected a Fellow of the Geological Society in 1865, and in 1916 was granted the Honorary Degree of D.Sc. by the University of Wales. He was greatly interested in the National Museum of Wales and a frequent benefactor.

In addition to his geological work Jordan was intensely interested in recent British marine mollusca and amassed a very fine collection which eventually passed into the writer's hands. He did an immense amount of dredging, and used to claim that he had dredged in all the British estuaries from Cornwall to Orkney. His collection was noteworthy for particularly fine specimens of their kind, and his favourite group was the Buccinidae.

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[1] *Ann. Mag. Nat. Hist.* (4), 7, 141, pl. 11, f. 13, 1871.

He wrote very little on the mollusca, and I only recollect two papers—one in this *Journal*, vi, pp. 225–239, on British Species and Varieties of *Fusus*, and the other in *Pr. Malac. Soc. London*, i, pp. 264–9, pl. xvi, on Some New Brit. Mollusca.

He died on 31st December, 1923.

We have received from the Managing Director of Penguin Books Limited the first four King Penguins to be published since Miss Elizabeth Senior, the original editor, died in a London air raid more than three years ago. Publication has now been resumed under the joint editorship of Dr. N. Pevsner of the *Architectural Review* and Mrs. R. B. Fishenden, editor of the *Penrose Annual*. Dr. Pevsner's *History of Architecture* has recently been published as a Pelican Book.

To us the most interesting of these new King Penguins is *British Shells*, by F. Martin Duncan, a short volume containing 32 pages and 16 plates.

The plates are reproductions from Forbes and Hanley's *History of British Mollusca and their Shells*, and are beautiful examples of colour printing, the figures of *Pholas dactylus*, *Cardium aculeatum*, and *C. echinatum* being especially good.

It is a pity to have revived the old myth of the existence of *Helix aperta* in Guernsey.

The other three books are *Elizabethan Miniatures*, by Carl Winter, *Fashions and Fashion Plates*, 1800–1900, by J. Laver, and *The Microcosm of London*—a selection of 16 plates by Rowlandson and Pugin, the text by John Summerson. The colour printing throughout is admirable.

ACCOUNTS FOR THE YEAR ENDING 31st DECEMBER, 1943.

Income and Expenditure Account.

Dr.

	£	s.	d.	£	s.	d.
To Annual Subscriptions—						
For 1943—						
67 at 10*s*.	33	10	0			
5 at 5*s*.	1	5	0			
(In 1942) 18 at 10*s*.	9	0	0			
On account and 2 at 5*s*.		16	0			
Arrears	30	16	8			
				75	7	8
,, Sale of Publications				39	15	8
,, Transfer				15	5	9
				£130	9	1

Cr.

	£	s.	d.	£	s.	d.
By publication and distribution of *Journal*—						
Vol. XXII, Part 1	34	6	0			
Ex do. Reprints	2	19	10			
				37	5	10
Vol. XXII, Part 2	32	5	8			
Ex do. Reprints	2	1	5			
				34	7	1
,, Printing and Stationery				2	10	0
,, Fire Insurance					10	0
,, Warehousing Stock				1	10	0
,, Subscriptions—						
Malacological Society	1	1	0			
Lancs. and Chesh. Fauna Com.		5	0			
Zoological Society		7	6			
				1	13	6
,, Bank Charges and Cheque Book					9	7
,, Officers' Expenses—						
Secretary	5	15	6			
Editor		10	6			
Treasurer	1	0	0			
				7	6	0
,, Balance, being excess of Income over Expenditure				44	17	1
				£130	9	1

Life Membership Fund.

	£	s.	d.
To Amount of Fund, 1st January, 1943	355	4	0
,, Dividend and Interest	15	5	9
	£370	9	9

	£	s.	d.
By Transfer to Income and Expenditure Account	15	5	9
,, Amount of Fund, 31st December, 1943	355	4	0
	£370	9	9

Research Fund.

	£	s.	d.		£	s.	d.
To Amount of Fund, 1st January, 1943 . .	326	16	2	By Amount of Fund, 31st December, 1943. Cap.	200	0	0
,, Dividend and Interest	14	3	0	,, Accumulated Interest	140	19	2
	£340	19	2		£340	19	2

BALANCE SHEET.

LIABILITIES.	£	s.	d.	£	s.	d.
Annual Subscriptions in advance received 1942 .				1	0	8
,, ,, ,, ,, ,, 1943 .				1	11	0
Life Membership Fund				355	4	0
Research Fund				340	19	2
Balance of Income and Expenditure Account—						
As on 1st January, 1943 .	168	2	1			
For 1943	44	17	1			
				212	19	2
				£911	14	0

ASSETS.	£	s.	d.	£	s.	d.
Investments.						
4% Funding Loan, £408 4*s.* 11*d.*, cost. .				350	0	0
3% Defence Bonds.				200	0	0
3½% War Loan, £40 11*s.* 8*d.*, cost . .				40	0	0
Cash at Banks—Nat. Prov. Bk. .	71	7	7			
P.O.S.B. . . .	250	6	5			
				321	14	0
				£911	14	0

NOTE.—Assets in addition to those set out in the Balance Sheet are (*a*) Library, (*b*) Cabinets and Collections, (*c*) Stock of unsold publications, (*d*) Annual Subscriptions in arrears, but against this must be set as a liability the cost of Vol. XXII, Part 3, issued 31st December and for which the account (amounting to £33 11*s.* 6*d.* plus cost of reprints) was not received in time for the above accounts.

Audited and found correct.
A. K. LAWSON.
C. H. MOORE.
24th February, 1944.

ALBERT E. SALISBURY,
Hon. Treasurer,
31st December, 1943.

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NOTICE TO MEMBERS

The Annual Meeting will be held in the Rooms of the Linnean Society, Burlington House, London, W. 1, on Saturday, February 24th, 1945, at 3 p.m.

Council Meeting at 2.30 p.m.

The President proposes to give an address on
"Work and Workers on British Mollusca".

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HOLOCENE DEPOSIT AT EPSOM.

By A. E. ELLIS.

IN June, 1944, during grave digging operations in Epsom cemetery, on the north-west slope of Epsom Downs, a pit was discovered, between 6 and 7 feet deep in chalk, at the bottom of which lay the skeleton of a calf, too immature for the species to be determined. Amongst the bones of the calf were numerous land shells, belonging to the following species :—

Pomatias elegans (Müller)
Cochlicopa lubrica (Müller)
Pupilla muscorum (L.)
Vallonia costata (Müller)
V. excentrica Sterki
Ena obscura (Müller)
Cochlodina laminata (Montagu)
Clausilia bidentata (Ström) (= *C. rugosa* auct. brit.)
C. rolphii Turton
Cecilioides acicula (Müller)
Discus rotundatus (Müller)
Vitrea crystallina (Müller)
Retinella pura (Alder)
R. nitidula (Drap.)
Oxychilus cellarium (Müller)
Trichia hispida (L.)
T. striolata (C. Pfeiffer)
Obvoluta obvoluta (Müller)
Vortex lapicida (L.)
Cepæa nemoralis (L.)

Of *C. rolphii* Mr. A. S. Kennard, who kindly examined the shells from this pit, writes that it " is very rare as a fossil, and is quite a find and a new record for Surrey ". *O. obvoluta* has been previously recorded as a fossil from the Holocene of the county, at Reigate and Betchworth, and dead shells are still to be picked up in Norbury Park, near Dorking, where they were first found by S. J. da Costa (*J. Conchol.*, 5, 1886, p. 81) and subsequently by K. McKean (*J. Conchol.* 10, 1902, p. 171).

Mr. Kennard writes : " It is clearly a ' ritual pit ', and that just begs the question. It had probably a religious motive of which we know nothing, and the age is Neolithic or Early Bronze, *circa* 1800 B.C. . . . I should think damp woodland or scrub, certainly not downland. I should think that there has been a camp there now destroyed."

It is difficult to account for the presence of the shells at the bottom of this pit. They may have been mixed up with the soil which was first shovelled in when the hole was filled up, or the snails may have crawled down through the interstices of the loose chalk before it became consolidated, either to hibernate or æstivate. Possibly snails are attracted by a corpse and gather to the feast ! The Bronze Age grave excavated in the grounds of Epsom College in 1938 (*J. Conchol.* 21, p. 90) yielded a somewhat similar fauna, though without *Clausilia* and *Obvoluta.* This, however, was a much shallower pit.

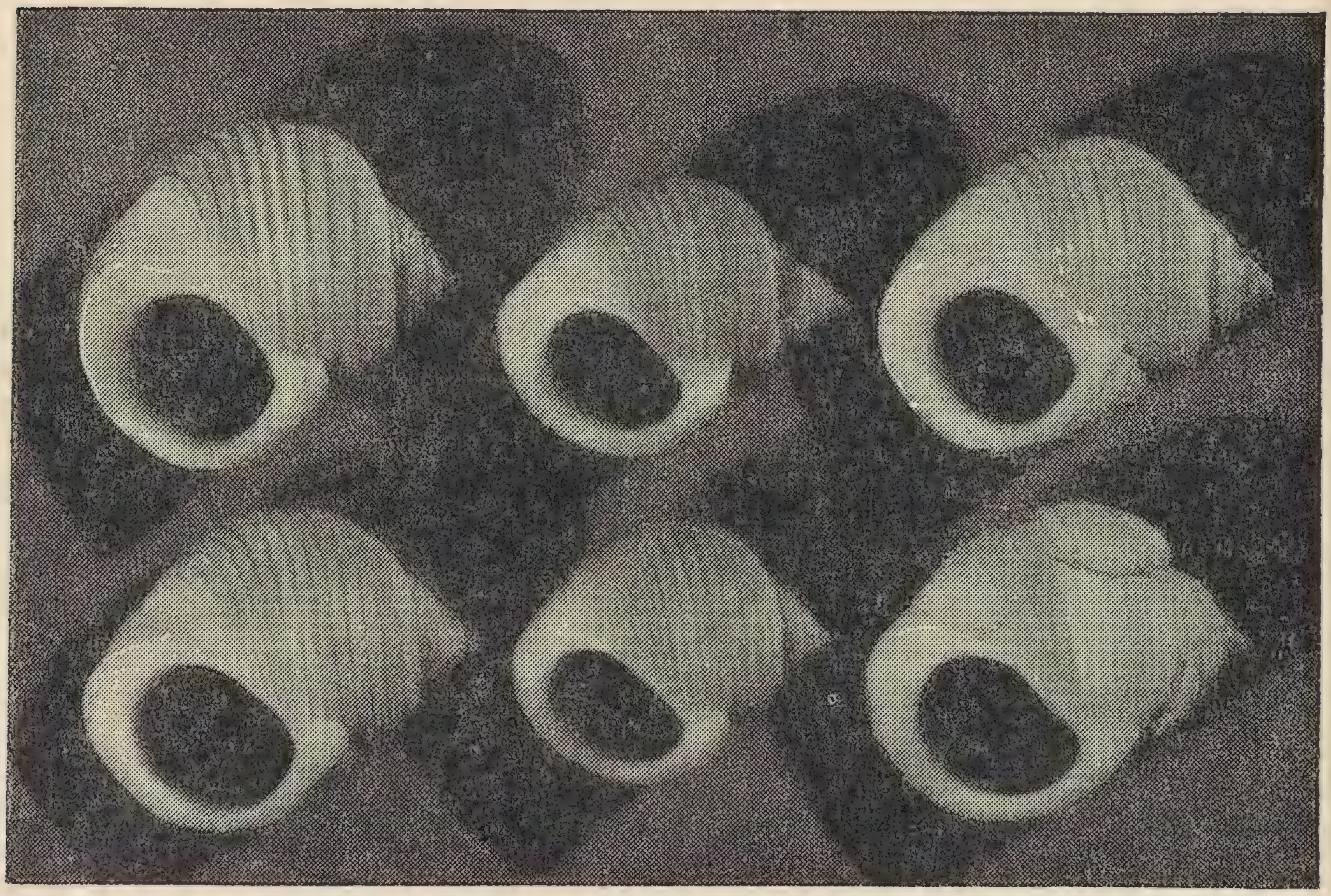
Mr. S. S. Frere, who directed me to the site, is writing an account of the excavation for the Surrey Archæological Collections.

NOTES ON *LITTORINA SAXATILIS* (OLIVI).

By N. F. McMillan.

In a previous note I gave some particulars of a bandless form, frequent in North Wales, of *Littorina saxatilis nigrolineata* Gray.[1] In this note I stated, following Dautzenberg and Fischer (1912, p. 196), that Jeffreys' var. *compressa* was merely a bandless variety of *nigrolineata*, to which subsp. I assigned the bandless Welsh specimens in question.

Subsequently my friend, Mr. J. R. le B. Tomlin, pointed out that the true identity of Jeffreys' variety had never been satisfactorily determined : it is hoped that the present notes will serve to clear up the problem.



L. rudis var. *compressa* Jeff. × 2. Bordeaux Harbour, Guernsey.

Littorina nigro-lineata was described by Gray in 1839 (p. 140), and his types (a set of eighteen) are in the British Museum Collection. Mr. Tomlin tells me that " most of them are banded, i.e. have black lines at the bottom of the furrows, and are the var. of *saxatilis* as usually recognized ".

Jeffreys' original description of his var. *compressa* (*British Conch.*, iii, 366, 1865) reads " Oval, compressed or squeezed together ; ribs flattened, defined by compressed lines instead of furrows ; last whorl extended lengthwise and disproportionately large, with the base consequently more angular than in the ordinary form ". No figure is given. Marshall (1898, p. 122) comments " var. *compressa*. This is like an elongated form of var. *sulcata* [= *nigrolineata* Gray] and differs from the unicoloured examples of that variety in being longer and narrower ", and Dautzenberg

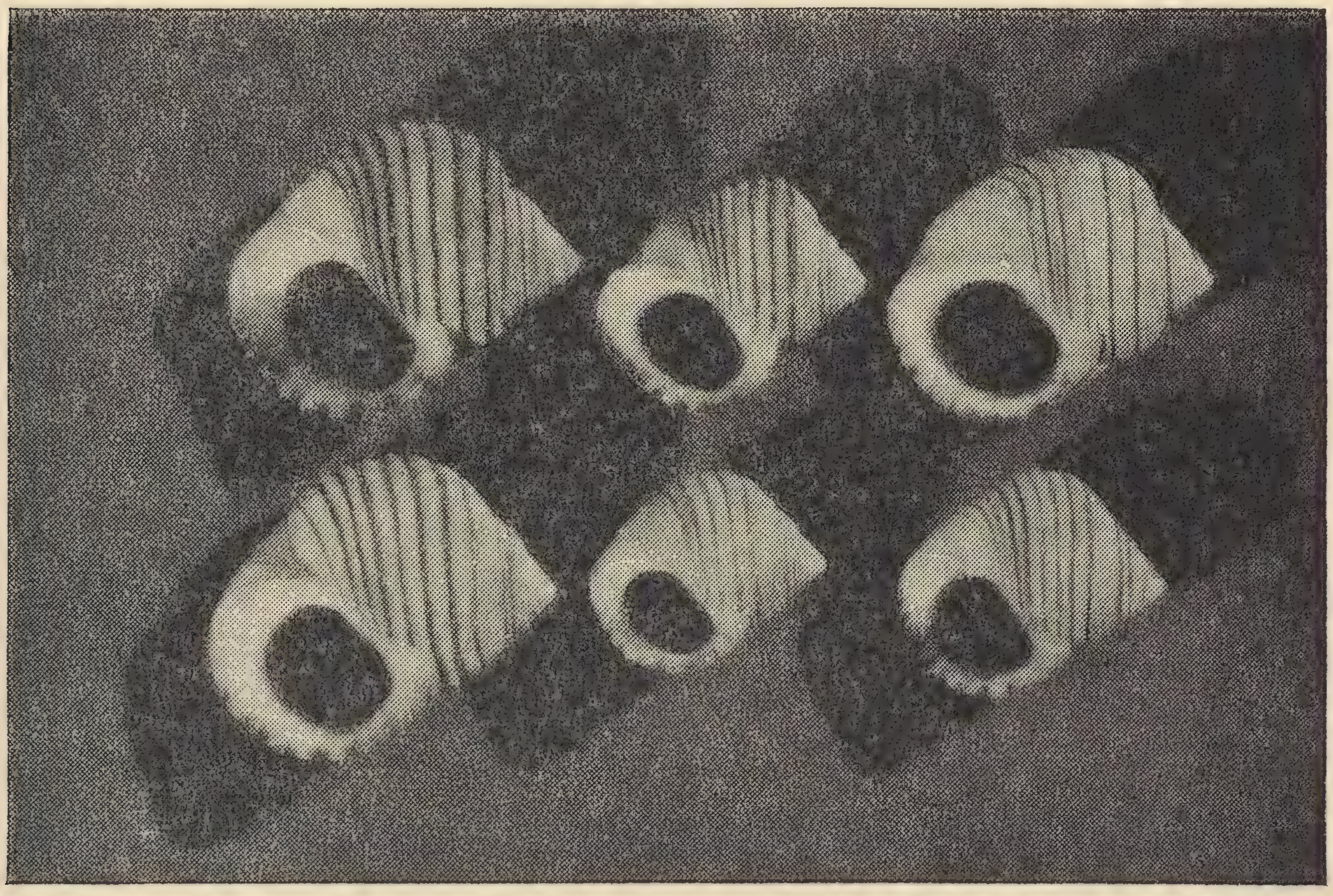
---

[1] I regret that by careless wording I made it appear that Jeffreys described *nigrolineata*. Actually, of course, he did not : he called the form *sulcata*.

& Fischer (above) and Dautzenberg & Durouchoux (1913) place it as a variety of the subsp. *nigrolineata* Gray.

As Jeffreys' collection is in Washington it seemed important to find out if possible exactly what Jeffreys himself labelled as var. *compressa.* Mr. Tomlin made inquiries of Dr. Bartsch, and the latter most kindly sent beautiful photographs of two sets of *Littorina saxatilis* labelled by Jeffreys as var. *sulcata* (i.e. *nigrolineata* Gray) and var. *compressa.*

The colouring is not stated, but it is clear beyond any doubt that Dautzenberg & Fischer were correct in placing Jeffreys' var. *compressa* as a bandless variety of *nigrolineata* Gray. The Jeffreysian *compressa* photographed are identical in outline, size, and sculpture with a series of bandless yellow *nigrolineata* collected at Gored, Beddmanach Bay, Anglesey, and agree equally well with other North Welsh material.



L. rudis var. *sulcata* Leach. × 2. Guernsey (McIntosh).

The colour of *compressa* varies widely, but is usually some shade of yellow. Out of some 150 specimens examined 80–90 per cent of the shells were yellow, and in Anglesey (where *compressa* is common) only yellow specimens have yet been found. I have, however, seen dark purplish-brown examples (Mahee Island, Strangford Lough, Co. Down), mauve (Port St. Mary, I.O.M.), chestnut (Herm), and white (Herm ; St. Helen's, Scilly), but all these appear to be rare.

In North Wales, as I have already noted, *compressa* is confined to the *Fucus vesiculosus* zone of the shore, and is not associated with the typical banded *nigrolineata*, which seems to be absent. At Cobo Bay, Guernsey, Mr. Tomlin tells me that typical *nigrolineata* and var. *compressa* occur abundantly together.

In Ireland both *nigrolineata* and var. *compressa* appear to be very rare, or perhaps merely overlooked. Nicholas (1900) does not mention either in his list of the Irish marine mollusca, and apart from the Mahee Island specimens already mentioned I have only seen one Irish set, a small series of typical banded *nigrolineata* and with them one white *compressa*, labelled "Murvey Rocks, Connemara". These shells are in Liverpool Museum Collection. I have not traced the "Murvey Rocks", but they are probably near Port Murvey, Aran, Co. Galway. In North-East Ireland *nigrolineata* appears to be represented only by the var. *compressa*, which is very rare.

From Scotland I have seen *compressa* from Balcomie Bay, Crail, Fife (coll. by Dr. C. Hay Murray), and a few from Traigh Mhor, island of Barra, Outer Hebrides. One pinky-orange shell in a small series from Loch Alsh (Winckworth Coll.) has the characteristic broad flattened ribs, and seems referable to *compressa*.

"*Littorina rudis* var. *sulcata*" is recorded in various local lists of mollusca, but in most cases it is not stated whether the banded *nigrolineata* or the self-coloured *compressa* was obtained. In the following table of localities I have therefore included only material which I have myself examined, with the exception of the Cobo Bay records which Mr. Tomlin kindly gave me, and Marshall's *compressa* records (*J.C.* ix, 122).

Littorina saxatilis nigrolineata Gray.—Cobo Bay, Guernsey (Tomlin); Longy, Alderney (Winckworth Coll.); Porthellick, St. Mary's, Scilly (W. Fowler); New Grimsby, Tresco, Scilly (Winckworth Coll.); W. coast Bryher, Scilly (Winckworth Coll.); Land's End (Mason Coll.), Cornwall (Mason Coll.); Abereiddy, N. Pembrokeshire (W. Lloyd James)[1]; Port St. Mary, I.O.Man (F. Taylor)[2]; Murvey Rocks, Connemara (Liverpool Mus. Coll.).[3]

Littorina saxatilis nigrolineata Gray var. *compressa* Jeffreys.—Harwich (Winckworth Coll.); Herm (Jackson Coll.); Pontac, Jersey (Dautzenberg & de Boury); Archirondel Bay, Jersey (Mrs. Morehouse); Tresco, Scilly (Winckworth Coll.); St. Helen's, Scilly (Mason Coll.); Torbay, S. Devon (recorded by Marshall, 1898); Tenby, S. Wales (recorded by Marshall, 1898); Porth Dinllaen, Lleyn, Caernarvonshire (N. F. McM.); Llandudno (N. F. McM.); Cemlyn Bay, Traeth Bycan, Penmon, Porth Penrhyn-Mawr, Gored (on Beddmanach Bay), Trearddhur Bay—all in Anglesey (N. F. McM.); Porth Lisky, St. David's, Pembroke (W. Lloyd James); Port St. Mary, I.O.Man (F. Taylor); Loch Alsh (Winckworth Coll.); Traigh Mhor, Barra (N. F. McM.); Balcomie Bay, Crail, Fife (C. Hay Murray); Mahee Island, Strangford Lough, Co. Down (R. J. Welch); "Murvey Rocks, Connemara" (*see* note 3 above).

I have also seen specimens of *Littorina saxatilis nigrolineata* Gray var. *matoni* Dautzenberg & Fischer (1912) from Archirondel Bay, Jersey (Mrs. Morehouse), and Holyhead, Anglesey.

---

[1] Very small, background colour pale grey, but broad ribs and bandings characteristic.

[2] One shell only, faintly striped.

[3] Probably Port Murvey, Aran, Co. Galway.

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GRAY *in* " Zoology of Capt. Beechey's Voyage . . . in H.M.S. *Blossom* in 1825, 1826, 1827, and 1828 ". " Molluscous Animals and their Shells, by John Edward Gray," pp. 103–153, 1839.

MCMILLAN, 1939. " *Littorina saxatilis nigrolineata* Gray." *Journ. Conch.*, xxi, 173–4.

MARSHALL, 1898. " Additions to British Conchology." *Journ. Conch.*, ix.

NICHOLS, 1909. " A List of the Marine Mollusca of Ireland." *Proc. Roy. Ir. Acad.* (3), v, 477–662.

Planorbis corneus (L.) in Wirral.—*P. corneus* is not, I think, native in Wirral, and is not recorded thence by any of the earlier workers (as Byerley, Whitehead, Higgins). Nevertheless it occurs now in several Bromborough ponds (mainly old marl-pits) : (1) Large artificial pond close to stable-yard at " Woodslee ". No introduced water-plants. Mollusca : *Planorbis corneus* (abundant), *Lymnæa peregra* (the lake form, *fide* F. Taylor). (2) Large deep pit known as Meadow House Pit, off Spital Road. No introduced water-plants. Mollusca : *Planorbis corneus* (abundant and fine), *Lymnæa peregra*, *L. auricularia*, *Sphærium corneum.* (3) Small deep pit, corner of Morland Avenue (in ground belonging to " Knockaloe "). No introduced water-plants. Mollusca : *Planorbis corneus*, *Planorbis vortex*, *Lymnæa peregra*, *Sphærium corneum.* (4) Large pit in field called " The Saighs ", off Brookhurst Road. Much *Elodea*, but no introduced plants. Mollusca : *Planorbis corneus*, *Lymnæa stagnalis*, *L. peregra*, *Sphærium corneum.* *P. corneus* formerly occurred in a group of large pits lying between Acre Lane and Allport Road (*fide* Dr. Helen Blackler). These pits are now filled in.

Mr. N. F. Ellison has sent me examples of *P. corneus* from " three ponds by footpath from Storeton to Thingwall, May, 1943 ", and Dr. Jackson, *23rd Ann. Rept. Lancs. and Ches. Fauna Committee*, p. 34, has recorded the species from Bidston Moss, near Wallasey (the first Wirral record). Mr. Stelfox's suggestion that someone planted *corneus* seems the most probable explanation. The nearest known locality is Oldham's " ponds near Chester where it was introduced in the early eighties " (*Naturalist*, 1908, p. 259).

N. F. MCMILLAN.

DESHAYES' REVIEW OF *TEREBRA*.

By J. R. LE B. TOMLIN.

IN the *Proc. Zool. Soc., London*, 1859, pp. 270–321, is " A General Review of the Genus *Terebra* and a Description of New Species, by Mons. Deshayes ".

The paper enumerates 221 species, a large number being new and mostly described from the Cuming Collection.

The following notes result from a careful examination of the British Museum series. Deshayes' Review includes thirty-seven species which were described and figured two years before in the *Journal de Conchyliologie*, vol. vi, pp. 65–102, plates iii, iv, and v, mainly from Cuming's Collection. The new species described in the *Proc. Zool. Soc.*, 1859, were not figured.

Some new species from Deshayes' own collection are not represented in the British Museum, and are probably to be found at Paris in the École des Mines. They are as follows :—

approximata, *argenvillii*, *chilensis*, *chinensis*, *columnaris*, *crassula*, *difficilis*, *dispar*, *eximia*, *histrio*, *obsoleta*, *puncticulata*, *souleyeti*, *splendens*, *subangulata*, and *verreauxi*.

In the case of some of the new species Deshayes mentions that it is to be found in his own collection as well as in that of Cuming.

Probably this signifies that Cuming had given him a specimen. Without exception the Cuming shells are named first, and I think one is justified in designating them formally throughout as the type specimens.

The numbers prefixed below are those of his Review. At the end of it he lists some sixty or more names which he regards as non-admissible, either as synonyms, as uncertain species insufficiently described or badly figured, or as species not belonging to the genus *Terebra*.

B.M. denotes British Museum.

5. *T. tiarella* Desh. *J. Conchyl.*, vi, 91, pl. v, f. 7. Cape Natal. Types (2) B.M.

6. *T. crenulata* Lam. Melvill and Standen described a var. *booleyi* in *Proc. Malac. Soc.*, iii, p. 42, pl. iii, f. 5, 1898, from the Andamans. Type B.M.

7 (by error 6). *T. fimbriata* Desh. *J. Conchyl.*, vi, 71, pl. v, f. 1. Hab ?. One syntype, B.M. = *crenulata* L.

8. *T. interlineata* Desh. *P.Z.S.*, 1859, p. 277. Hawaii. Type B.M. This is a var. of *crenulata* with stronger and more numerous axial ribs, due to a very bad mend on the fifteenth whorl.

10. *T. trochlea* Desh. *J. Conchyl.*, vi, 89, pl. v, f. 6. Zanzibar. Types (2) B.M.

11. *T. sowerbyana* Desh. *J. Conchyl.*, vi, 93, pl. iii, f. 8. Gambia. Type B.M.

12. *T. reevei* Desh. *J. Conchyl.*, vi, 88, pl. iv, f. 14. Moluccas. Types (3) B.M. These are white *duplicata*.

13. *T. gouldi* Desh. *J. Conchyl.*, vi, 89, pl. v, f. 2. Hawaii. Type B.M.

17. *T. festiva* Desh. *J. Conchyl.*, vi, 74, pl. iii, f. 4. Senegal. Types (3) B.M. = *ferruginea* Born.

18. *T. speciosa* Desh. *P.Z.S.*, 1859, 279. Hab. ? Types (2) B.M. They are small, strongly marked *ferruginea* Born.

19. *T. dillwynii* Desh. *P.Z.S.*, 1859, 279. Japan. Type B.M. = *ferruginea* Born (much worn).

21. *T. marmorata* Desh. *P.Z.S.*, 1859, 279. Moreton Bay. Type B.M. The original label has "Port Curtis".

32. *T. pura* Desh. *J. Conchyl.*, vi, 82, pl. v, f. 8. Zanzibar. Type B.M.

33. *T. glabra* Desh. *J. Conchyl.*, vi, 101, pl. v, f. 13. China. Type B.M. = *consors* Hinds.

34. *T. buccinulum* Desh. *J. Conchyl.*, vi, 92, pl. v, f. 12. Australia (côte orientale), Coll. Cuming, but no longer there.

36. *T. solida* Desh. *J. Conchyl.*, vi, 78, pl. iii, f. 11. Japan. Type B.M.

39. *T. circumcincta* Desh. *J. Conchyl.*, vi, 77, pl. iii, f. 9. Red Sea. Type B.M.

44. *T. incolor* Desh. *P.Z.S.*, 1859, 283. Philippines. Type B.M. It is a poor, worn example of *casta* Hinds.

47. *T. bipartita* Desh. *P.Z.S.*, 1859, 284. Hawaii. Type B.M. This is just a small *casta*.

48. *T. apicina* Desh. *P.Z.S.*, 1859, 284. Singapore. Types (3) B.M.

49. *T. bacillus* Desh. *P.Z.S.*, 1859, 285. Hawaii. Types (5) B.M.

50. *T. dunkeri* Desh. *P.Z.S.*, 1859, 285. Hab. ? New name here given to *T. eburnea* Dunker 1853 non *T. eburnea* Hinds 1844.

52. *T. lactea* Desh. *P.Z.S.*, 1859, 285. Hawaii. Cuming Collection, but no longer there.

53. *T. traillii* Desh. *P.Z.S.*, 1859, 285. Vizagapatam. Types (4) B.M.

57. *T. continua* Desh. *P.Z.S.*, 1859, 286. Hab. ? Type B.M.

58. *T. acumen* Desh. *P.Z.S.*, 1859, 287. Hab. ? No longer in the Cuming Collection.

60. *T. matheroniana* Desh. *P.Z.S.*, 1859, 287. Tahiti. There are three in the B.M., not types, on the same tablet as *lauta* Pease (3), which may be a large variety.

61. *T. sallæana* Desh. *P.Z.S.*, 1859, 287. Mexico. Types (3) B.M.

62. *T. caliginosa* Desh. *P.Z.S.*, 1859, 287. Philippines. Type B.M.

64. *T. modesta* Desh. *P.Z.S.*, 1859, 288. Mouth of the Indus. Types (2) B.M. = *matheroniana* Desh.

66. *T. bourguignati* Desh. *P.Z.S.*, 1859, 288. China. Type B.M. = *plumbea* Q. and G.

67. *T. crossii* Desh. *P.Z.S.*, 1859, 289. Indian Ocean. Type in Crosse Coll.: the B.M. has a specimen. This = *venosa* Reeve *non* Hinds, and, *fide* Smith = *subdivisa* Philippi in *Zeitschr. f. Malak.*, viii, p. 96.

68. *T. philippiana* Desh. *P.Z.S.*, 1859, 289. Marquesas ? Type B.M.

79. *T. adansoni* Desh. *P.Z.S.*, 1859, 291. Senegal. Types (3) B.M. = *micans* Hinds.

84. *T. nana* Desh. *P.Z.S.*, 1859, 291. Mouth of the Indus. Type B.M.

88. *T. evoluta* Desh. *P.Z.S.*, 1859, 292. Japan. The specimen in the B.M. is about 56 mm. long whereas the type (Coll. Cuming) was

only 50: it is doubtless one of the many cases where Cuming eventually substituted a finer specimen for the original type.

90. *T. bernardii* Desh. *J. Conchyl.*, vi, 84, pl. iv, f. 10. Australia (côtes orientales). Type B.M. In the *P.Z.S.*, 1859, p. 293, said to be " ma collection ". It is very near to *duplicata*, with narrower and closer ribs.

91. *T. jukesi* Desh. *J. Conchyl.*, vi, 95, pl. v, f. 9. Port Essington. Type B.M.

92. *T. addita* Desh. *P.Z.S.*, 1859, 293. Tasmania. Type B.M.

93. *T. plicatella* Desh. *P.Z.S*, 1859, 293. Tasmania. = *nitida* Hinds (*fide* Reeve).

94. *T. longiscata* Desh. *P.Z.S.*, 1859, 294. Philippines. The single example in the B.M. does not agree in dimensions, no doubt for the same reason as is suggested in the case of no. 88.

96. *T. ustulata* Desh. *J. Conchyl.*, vi, 97, pl. iii, f. 12. Tasmania. Type B.M.

97. *T. kieneri* Desh. *P.Z.S.*, 1859, 294. Tasmania. Types (2) B.M. New name for the shell which Kiener figures as a var. of *duplicata* on pl. xii, f. 26A.

106. *T. nodularis* Desh. *P.Z.S.*, 1859, 295. Hawaii. Types (3) B.M.

108. *T. geminata* Desh. *P.Z.S.*, 1859, 296. Cape Natal. Type B.M. = *T. spectabilis* Hinds.

109. *T. marginata* Desh. *J. Conchyl.*, vi, 86, pl. iv, f. 8. Gambia. Type B.M. = *T. intertincta* Hinds.

110. *T. brevicula* Desh. *P.Z.S.*, 1859, 296. Tasmania. Type B.M.

112. *T. bruguieri* Desh. *P.Z.S.*, 1859, 297. China. Type B.M. This name replaces *T. hindsi* Desh., *J. Conchyl.*, vi, 81, pl. v, f. 5, China, *non T. hindsi* Carpenter in the Mazatlan Catalogue.

113. *T. amœna* Desh. *P.Z.S.*, 1859, 297. China. Type B.M. This is the same as no. 21, *T. marmorata* Desh.

114. *T. pulchella* Desh. *J. Conchyl.*, vi, 94, pl. v, f. 4. China. Type B.M.

115. *T. crenifera* Desh. *P.Z.S.*, 1859, 298. China. Type B.M.

116. *T. blanda* Desh. *P.Z.S.*, 1859, 298. Japan. Type B.M.

122. *T. flavescens* Desh. *P.Z.S.*, 1859, 299. Hawaii. Type B.M.

126. *T. swainsoni* Desh. *P.Z.S.*, 1859, 299. Hawaii. Type B.M.

129. *T. undatella* Desh. *P.Z.S.*, 1859, 300. New name here given to *T. cancellata* Hinds 1844, non *T. cancellata* Q. & G. 1832. Hab. ?

132. *T. badia* Desh. *P.Z.S.*, 1859, 300. Guinea. New name for *T. castanea* Hinds, *Thes. Conch.*, i, 161, pl. 43, f. 59, 1845, *non* Kiener, p. 19, pl. vii, f. 14, 1838–9. Reeve described this species as *T. ligneola* in *Conch. Ic.*, pl. vii, sp. 25, March, 1860, from China, but subsequently withdrew his name when he found that Deshayes had anticipated him. The types (3) of *ligneola* are in the B.M., but it is impossible to say whether they are also the types of *badia*.

137. *T. exigua* Desh. *P.Z.S.*, 1859, 301. Australia (east coast). Type ? B.M. (only 15 mm. in length whereas Deshayes gives 19 mm.) = *textilis* Hinds.

138. *T. polygyrata* Desh. *P.Z.S.*, 1859, 301. Philippines. Type B.M. = *textilis* Hinds.

141. *T. petiveriana* Desh. *J. Conchyl.*, vi, 85, pl. v, f. 10. Panama. Types (2) B.M. Very near *aspera* Hinds. Said by Deshayes to be the shell figured by Petiver in the Gazophylacium, pl. lxxv, f. 5.

144. *T. peasii* Desh. *P.Z.S.*, 1859, 302. Hawaii. Type B.M. = *flava* Gray.

158. *T. cinctella* Desh. *P.Z.S.*, 1859, 305. Mouth of the Indus. Types (3) B.M.

171. *T. tristis* Desh. *P.Z.S.*, 1859, 306. Japan. Type B.M. *T. antarctica* Smith, Types (4) B.M., *Ann. Mag. Nat. Hist.* (4), xi, 270, 1873, is a synonym of *tristis*, and so is *kirki* Hutton. The locality Japan is clearly erroneous.

175. *T. formosa* Desh. *J. Conchyl.*, vi, 65, pl. iii, f. 6. Panama. Type B.M.

177. *T. incomparabilis* Desh. *P.Z.S.*, 1859, 307. Panama. Type B.M. = *formosa* Desh.

179. *T. consobrina* Desh. *J. Conchyl.*, vi, 72, pl. iii, f. 3. Red Sea. Types (3) B.M., and are there labelled " Massau, sandy mud, deep water ".

180. *T. insignis* Desh. *J. Conchyl.*, vi, 70, pl. iii, f. 2. Panama. Type B.M. = *lingualis* Hinds.

182. *T. histrio* Desh. *J. Conchyl.*, vi, 76, pl. iv, f. 11. Hab. ? Type given as in " ma collection ", but there is one in the Mus. Cuming, which is merely a short, stumpy form of *corrugata*.

192. *T. virginea* Desh. *J. Conchyl.*, vi, 83, pl. iv, f. 12. Zanzibar. Type B.M. = *consors* Hinds.

197. *T. pallida* Desh. *J. Conchyl.*, vi, 87, pl. iv, f. 3. Marquesas Is. Types (3) B.M. = *cingulifera* Lam.

198. *T. cumingii* Desh. *J. Conchyl.*, vi, 66, pl. iii, f. 1. China. Type B.M. Very near to *lima* Desh. and *triseriata* Gray.

201. *T. regina* Desh. *J. Conchyl.*, vi, 67, pl. iii, f. 7. Senegal. Type B.M. = *corrugata* Lam.

202. *T. lima* Desh. *J. Conchyl.*, vi, 69, pl. iv, f. 2. China. Type B.M.

204. *T. fortunei* Desh. *J. Conchyl.*, vi, 79, pl. iv, f. 1. China. Type B.M. In the *P.Z.S.*, 1859, p. 312, Deshayes spells it *fortunii*.

209. *T. bitorquata* Desh. *P.Z.S.*, 1859, 313. Hab. ? Type in coll. Crosse. New name for Kiener's *T. corrugata* Lam. var. junior, *Coq. Viv.*, p. 25 note, pl. xiii, f. 31a.

211. *T. loroisi* Desh. *P.Z.S.*, 1859, 313. Hab. ? New name for *T. nebulosa* Lorois, *J. Conchyl.*, vii, 90, pl. i, f. 4, 1858. Hab. ? nec Sowerby nec Kiener.

212. *T. albomarginata* Desh. *P.Z.S.*, 1859, 314. Australia. Type B.M. A latticed shell.

214. *T. decorata* Desh. *J. Conchyl.*, vi, 75, pl. iv, f. 13. Pidang, Sumatra. Types (2) B.M. = *tessellata* Gray.

216. *T. archimedis* Desh. *P.Z.S.*, 1859, 314. Hab. ? This is said to be " ma collection ", but the B.M. has three which are presumably syntypes.

218. *T. circinata* Desh. *J. Conchyl.*, vi, 99, pl. iv, f. 6, 7. China. Type B.M. = *anilis* Röding.

219. *T. acuta* Desh. *J. Conchyl.*, vi, 100, pl. iv, f. 4, 5. China. Type B.M. = *anilis* Röding.

221. *T. prælonga* Desh. *P.Z.S.*, 1859, 315. Port Curtis. Types (2) B.M. These are large examples of *triseriata* Gray.

Probably there is more synonymy to be worked out with regard to Deshayes' new species, but so often the available material is too small and the specimens in second-rate condition. It would be a great advantage too to get the types at the École des Mines overhauled.

Deshayes was one of Cuming's most obedient lieutenants, always ready to describe whatever Cuming instructed him to regard as new.

P. rotundata v. *alba* Moq. near Doncaster.—On 30th June, 1943, a friend and I found a not quite mature example of this in a limestone quarry on the way to Campsall, 5 mm. in diameter (vice-county 63). With it occurred *H. hispida* (white var.), *C. lubrica*, *V. excentrica*, and *Lauria cylindracea*.

On 6th May last another almost adult var. *alba*, 6 mm. in diameter, turned up in the valley of the Don at Levitt Hagg quarries, two miles south-west of Doncaster. It is not so purely white as the Campsall specimen, showing a faint tinge of brown in part. With it occurred *Carychium minimum* (one dead), *Claus. rugosa*, *C. lubrica*, *Vitrea crystallina*, *Retinella pura*, and *Oxychilus rogersi*.

A. S. Cook.

EDITORIAL NOTES

I AM much indebted to Mr. D. C. Thomas, of the Seale Hayne Agricultural College at Newton Abbot, for a copy of a paper entitled "Field Sampling for Slugs", published in *The Annals of Applied Biology*, vol. 31, no. 2, pp. 163–4, May, 1944.

It describes attempts to measure slug populations on a field scale. The first method tried was to examine soil samples of known size. This was soon found to be unsatisfactory—slugs were missed when covered with particles of soil or were squashed in taking the sample, and it was impossible to determine the depth of soil necessary in order to get a true estimate.

A second method was to place 6 in. squares of turf grass side downwards in the the field and to count the slugs thereunder at ten-day intervals. Various difficulties and errors were incidental to this method; e.g. slugs were introduced in the turves—in forty turves examined thirty-four slugs were found, equivalent to introducing a population of 425,000 per acre! It was therefore decided to test the possibilities of a metaldehyde-bran bait, five teaspoonfuls of bran being used to half-teaspoonful of metaldehyde per trap. Certain experiments were then made to ascertain the area from which slugs were attracted, and the percentage of slugs in that area which were so attracted.

It was found that in a rough wheatfield in winter the maximum distance from which *Agriolimax reticulatus* (Müller) was attracted was about 3½ feet, and an estimate was arrived at of 600,000 per acre in a field of wheat very severely damaged by these slugs.

In a field of cow-cabbage seedlings at Paignton damage was found to be due to *M. gagates* and not to *A. reticulatus*.

The paper also contains details as to slug poisons and estimates as to their efficiency.

In this *Journal*, vol. xiii, p. 202, 1911, Marshall has a note on the recorded occurrence of *Triton nodiferus* Lamarck in 1832 in Guernsey.

Marshall subsequently sent me the following additional particulars:—

"One *T. nodiferus* is still in the Lukis collection, which has always been jealously guarded as if of priceless value, and repeated requests to see it have always been evaded. Madame Lukis after her husband's death kept it for some years but would not show it, and when Capt. Lukis returned to Guernsey he was asked to take charge of it, and put it in a lumber cellar.

"When he died his effects were sold by auction; the collection was included, but was rescued by Mrs. Le Mottée, a daughter of Dr. Lukis, of Guernsey, where the collection now remains."

Subsequently, some years after Marshall's death the house where the Lukises lived was converted into a museum to contain all the prehistoric material that old Dr. Lukis had dug as well as his other collections.

Colonel de Guerin was the honorary curator, and not very long before he died he took me into a basement room not generally shown to the public, and there I pointed out to him a *Triton*, which was undoubtedly the shell to which Marshall refers above. It was unlabelled and de Guerin promised to have it properly labelled and cared for.

Marshall told me at the same time that Judge Macculloch's and Gallienne's collections were incorporated in that at the Guille-Allée in Peterport, while Miss Griffith's collection went to the Torquay Museum.

It has been felt for a long time that some definite records of conchologists are much needed.

Occasional individual notices occur in print if a collector has become known in other ways, or if his collection has eventually been incorporated in some museum, but as a rule his name just disappears from among the members of one of the two Societies and that is all.

Mr. Winckworth and I are trying gradually to assemble short biographical data about anyone who has, or who has had, any claim to be looked on as a conchologist or malacologist.

The items which we desiderate are more or less the following :—

Full names.
Dates of birth (and death).
Short details as to education, profession, and marriage.
Any facts about collection.

These data will be enrolled in card index form on 5 in. by 3 in. cards.

Details are equally welcome about conchologists in the Colonies or elsewhere abroad.

Later on it may be feasible from time to time to publish names of past members or others about whom information is lacking.

The magazines devoted to conchology in this country and abroad have already all been ransacked.

I should be very grateful to any member who would send me material on the lines suggested above, however incomplete, relating either to his own life or to that of any past member.

[Extracts from a naturalist's letter received just before the war.]

KHAO SABAP,
CHANTABOON, SIAM.

I have now been down here six weeks, and with the exception of one native who brought me in twelve *Rhiostoma* I have been unable to get anything worth having. I had them well alcoholed and put them one afternoon out on a newspaper preparatory to packing, but by next morning not one was to be seen—the rats had got them all. However I still have a new lot.

It is difficult for anyone who hasn't been in close touch with the native here to understand his mentality. The negro is supposed to be lazy, but he is a novice compared with the Siamese.

Just as I write a young lad has brought in some shells including three *Rhiostoma* I met him this morning in a fruit garden on my way up the hill, and as he looked more intelligent than the usual native I told him of my requirements. As he could not have spent any length of time searching it is clear that the shells are there to be found. I did not pay him in cash but gave him a promise of substantial reward for future results. Work a native must when pushed to it, but with a little money in his pocket he is the lord of the air.

I have decided to stay here another fortnight and take the risk of the weather. If it is bad for insects it may be productive in shells. But these lazy beggars, wearing practically no clothes, object to getting wet much more than I do, so there can be no certainty about results.

MOLLUSCA OF THE POCKLINGTON CANAL

By Harry Sowden.

(Read before the Society, 2nd November, 1935.)

Learning at Willowsyde, York, on the 19th June that the water in the Pocklington Canal had been run off for the purpose of cleaning out the accumulation of mud in the bed of the canal, and thinking that this would be a splendid opportunity to investigate the molluscan fauna, Dr. J. S. Gayner and I arranged that we would pay the place a visit for that purpose. On 24th June we journeyed out by bus to the nearest approach to where the canal joins the River Derwent, near East Cottingwith. We crossed the river by the ferry-boat and then made for the lock nearest to the canal's junction with the river.

We had been informed that prior to the water being let out the canal had been dragged with nets, the fish caught and removed to other waters.

We expected to see something out of the ordinary, but not the distressing sight that met our view when we reached our scene of operations. It was a gloriously fine morning, the sun shining brilliantly from a cloudless sky, and it would have been oppressively hot had it not been for a refreshing breeze blowing across the canal.

There was no water in the canal except a few small pools here and there in little hollows in the centre of the channel, evidently caused by groups of Yellow Water-lilies (*Nuphar luteum*), the creeping stems of which crossed and recrosssed each other and formed what looked somewhat like the meshes of a great net made of thick cables stretched across the bed of the canal. I measured some of these creeping stems and found them to average between 3 and 3½ inches in diameter. There were very few developed leaves, and these together with a few of the lilies' yellow flowers lay on the mud struggling for existence.

In other places groups of the common Arrowhead (*Sagittaria sagittifolia*) had managed to develop their sagittate leaves and send up a few flower stems, but with leaf stalks and flower stalks both much dwarfed.

These two species and the broad-leaved pondweed (*Potamogeton natans*) were the only plants to be seen growing in any quantity towards the centre of the channel, but there was a plentiful supply of aquatic and semi-aquatic plants growing at the old high-water level at the sides.

What to me was the saddest part of the picture was the large number of dead and dying mollusca which had been left stranded on the mud by the receding water. We could have gathered thousands of their shells had we wanted them, most of them still occupied by the dead or dying animals. The most conspicuous were of course the shells of the larger species, such as *Unio* and *Anodonta*, but the most numerous some of the species with smaller shells.

Had we required them we could have collected hundreds of fairly large *Unio* and *Anodonta*, thickly strewn on the mud along the channel, many of them with their shells partly open and exposing the dying animals. A great many more were still fully alive with their shells partly buried in cracks in the mud. They varied much in age and size, the smallest being less than 1 inch and the largest 6½ inches, measuring from the anterior to the posterior angle.

The two hours at our disposal we devoted to the examination of the mud in the channel, and the vegetation at the east side of the canal for a length of about 200 yards, to discover how many species of mollusca this portion of the canal contained. I give here a list of the species and varieties we found :—

Zonitoides nitidus (Müller). Six at the base of the reeds at the side of canal. (Second visit, five.)

Lymnæa auricularia (Linné). Only one specimen on the mud.

Lymnæa peregra (Müller). One specimen of the variety *ovata*, none of type form. (Second visit, two specimens.)

Lymnæa stagnalis (Linné). One specimen on the mud at the side. (Second visit three specimens.)

Planorbis albus (Müller). One at the roots of the reeds. (Second visit, two specimens.)

Planorbis carinatus (Müller). Abundant at and amongst the roots of the reeds and on the mud at the side.

Planorbis spirorbis (Linné). Abundant amongst the roots of the vegetation at the side and on the mud.

Physa fontinalis (Linné). Only one adult specimen but very young ones were plentiful.

Bithynia tentaculata (Linné). Very abundant on the mud and at the roots of vegetation.

Bithynia leachii (Sheppard). Very plentiful as above.

Viviparus viviparus (Linné). Abundant on and half buried in the mud.

Valvata cristata (Müller). A few at the base of the reeds, but mostly on the cases of caddis-fly larvæ.

Unio pictorum (Linné). Abundant, alll ages and sizes.

Anodonta cygnea (Linné). Very abundant ; all sizes from under 1 inch to 6½ inches.

Anodonta anatina (Linné). Several.

Sphærium rivicola (Leach). Plentiful, many fine specimens.

Sphærium corneum (Linné). Very abundant on the mud and amongst roots of vegetation at the side.

Pisidium amnicum (Müller). Amongst the mud but not very plentiful.

Pisidium ? (sp. not determined). A few on the mud at the base of reeds, but mostly on the cases of caddis-fly larvæ.

A total of nineteen species and varieties, including one land and eighteen freshwater species.

On reaching home I cleaned the few shells I had selected and found that the bodies of *V. viviparus*, *S. rivicola*, and *S. corneum*, which are all viviparous species, contained young ones.

I did not examine the bodies of *Unio pictorum* and *Anodonta cygnea* for traces of glochidia, but it is possible and very probable that many of them would have been discharged into the water prior to the date when the water had been let out of the canal, and if so no doubt many of them would have succeeded in attaching themselves to the gills, fins, and scales of the fish upon which they pass the first stage of their existence, and would be also removed with them to other waters.

On 15th July we revisited the place. Nothing had been done during the interval towards cleaning out the canal, and the conditions were similar to those prevailing on our first visit, except that there was slightly less water in the centre of the channel and, owing to the continued drought, the mud had become drier and more cracks had formed.

After a further two hours' search we found that although we had discovered all the species we noted on our first visit except *L. auricularia*, we did not find any additional species to add to the list.

Living forms of many of the species were still plentiful partly buried in the mud, but not so numerous as on our first visit.

I was rather surprised at *L. auricularia*, *L. peregra*, and *L. stagnalis* being so few in number. All the specimens of these three were fully grown, and it seemed strange that young ones were entirely absent.

Our only fresh discovery was a patch of the Flowering Rush (*Butomus umbellatus*) in flower, which we had failed to notice on our first visit. Should the mud in the channel be taken out, and the vegetation at the sides removed before the canal is refilled with water it is very unlikely that many living molluscs will escape and be left to perpetuate their species. Consequently we may safely presume that it will take years before this part of the canal is again stocked with such an interesting variety of species.

C. rolphii Leach in Berkshire.—A few days ago Mr. C. S. Elton showed me a specimen of *Clausilia rolphii* Leach which he had captured alive under a log at Wytham. This species has not been taken in the Oxford district since it was recorded in 1883 by the Rev. S. S. Pearce, who found it at South Hinksey (*Zoologist*, 327). When I wrote the article on *Mollusca* in the *Victoria County History of Oxfordshire* I remarked that the species is almost certainly now extinct in this area. Obviously I was wrong, and this new find shows how easily a species can escape notice even in a district which has been very thoroughly and continuously examined. *C. rolphii* must have been resident throughout along the western slopes of the Thames valley in this neighbourhood.

L. W. GRENSTED.

LISTS OF BRITISH SHELLS.

By J. R. le B. Tomlin.

1841 ? The earliest British list that I can trace is " Catalogue of Brit. Land and Freshwater Shells compiled from Gray's edition of Turton's Manual ". This was published by T. B. Hall, of Coggeshall, Essex, a friend of J. Brown, S. P. Woodward, and other conchologists of the time. As Gray's book appeared in 1840 one may date Hall's list about 1841 : the British Museum copy has written on it, " James Backhouse, Micklegate, York, 9 Dec., 1842."

Hall used to sell shells, and some of his specimens are in the British Museum.

May, 1847. Mr. Kennard has a long duodecimo (2¼ in. by 4¾ in.) " Catalogue of the British Land and Freshwater Mollusca to which is appended a list of those found in brackish water as well as of those foreign species which have been introduced into the British Islands arranged according to the systematic distribution of Gray's edition of Turton's Manual ". No author's or printer's name is given, but it appears to have been printed by a good man. The copy belonged to S. P. Woodward.

January, 1852. " Catalogue of British Marine Recent Shells, printed for the British Natural History Society, price one shilling."

This was compiled from Forbes and Hanley and printed by H. Sotheran, Coney Street, York. It was preceded by several short, incomplete lists : I have seen one which is called " merely temporary " and dated " York June 1851 ", and another dated York, 23rd December, 1851, called " Catalogue of British Marine Recent Shells ".

The above Society was started by Edward Charlesworth, and in November, 1860, he published " Alphabetical List of British Land and Freshwater Shells " with his name attached, also compiled from Forbes and Hanley.

1857. R. Damon, of Weymouth, published " A Catalogue of the Shells of Great Britain and Ireland with their synonyms and authorities ". This contains both Marine and Land and Freshwater Shells and is based on Forbes and Hanley.

Later on Damon issued a " Priced Catalogue of British Shells " with additions published by Jeffreys in *Ann. Mag. Nat. Hist.*, 1858–9.

One can therefore date this as post 1859.

Other publications of Damon's were more partial and listed what he had in stock at the time.

1860. " List of the British Marine Invertebrate Fauna " drawn up by Robert McAndrew for the Dredging Committee of the British Association, and published in the 1860 Report of the Association, the mollusca on pp. 218–222. This was reprinted in the same year in quarto form with space for notes and observations, to be distributed to naturalists. McAndrew acknowledges the co-operation of Dr. Baird and Mr. S. Woodward, and says that the catalogue of mollusca is taken from Forbes and Hanley.

1866. H. K. Jordan published "A Catalogue of British Mollusca" compiled from volumes 1, 2, and 3 of Jeffreys' *British Conchology*. A second part appeared in 1870, completing the Catalogue from vols. 4 and 5.

1868. A neat little list in a blue cover, measuring 4 in. by 2½ in. by Joseph Wilcock, of Wakefield, entitled "A Catalogue of British Land and Fresh Water Shells, compiled from vol. i and supplement vol. v of *British Conchology*, Jeffreys, price twopence".

Jeffreys gave me three copies of this list in 1881 when I was still at school, for labelling.

April, 1883. "The Conchological Society's List of British Land and Freshwater Mollusca," drawn up by Taylor, Roebuck, and Nelson, with the president and secretary, and published in the *Journal of Conchology*, vol. iv, pp. 45–52. Separate copies were reprinted on an 8-page leaflet and paged 1–8.

Taylor Brothers about this time published a "Label List of Brit. Land and Freshwater Shells", an "Exchange List" of the same, and a single sheet entitled "Brit. Land and Freshwater Shells with Varieties".

April and July, 1885. "Census of the Authenticated Distribution of British Land and Freshwater Mollusca," by Taylor and Roebuck.

This was the first complete result published of Roebuck's Census and appeared in this *Journal*, iv, pp. 319–336. The addition of foreign records here and there was a mistake, and probably the identifications are not always correct.

January, 1886. "British Marine Shells comprising those of the Brachiopoda and Mollusca (Proper). After the arrangement in Jeffreys' *British Conchology*, with alterations and additions to 1885: varieties in small type. (Authorities bracketed in accordance with British Association Rules.)"

This 4-page list was "printed for A. Somerville, B.Sc., F.L.S., 34 Granby Terrace, Hillhead, Glasgow, Jany. 1886".

1887. "A Pocket List of British Marine Mollusca compiled by the Rev. Geo. Bailey, F.R.M.S., etc., price 6d."

Bailey was, I believe, vicar of Finchingfield in Essex. The List was printed by Tindall and Co., of Newmarket: it consisted of 44 pages, measured 5 in. by 3¼ in., and was compiled from Jeffreys with later additions.

1887. "A Complete Catalogue of British Mollusca compiled from Jeffreys' *British Conchology* with alterations and additions to date, by Charles Jefferys, price 1s. 3d."

This was apparently published by Herbert W. Marsden, of Gloucester, but was also procurable from the compiler, 15 Warren Street, Tenby. Undated copies occur. A separate catalogue of Land and Freshwater Mollusca only was also issued, price 4*d*., and Exchange Lists of Marine Shells at 8*d*. a dozen.

1889. A List in "Land and Freshwater Shells (Young Collector series)", by J. W. Williams, chapter v, pp. 94–112. The List was compiled by Taylor and Roebuck, and brings the Census of 1885 up to date.

An essential key to the counties and vice-counties is added, and the non-British localities are very wisely omitted.

A second edition of this work was published by Williams in 1892 identical in every respect with the first, except for the "second edition" and date on the title.

These two editions were in board covers.

In 1901 appeared a third and revised edition in soft linen cover, in which the Census was again brought up to date by Taylor and Roebuck, chapter v, pp. 94–112, as before.

1890. "The British Naturalist Catalogue of the Land and Freshwater Mollusca of the British Isles with all the named varieties, by Theo. D. A. Cockerell, price sixpence."

The *British Naturalist* at that time was conducted by John E. Robson, of Hartlepool, and published by Swan Sonnenschein and Co., of Paternoster Square.

1896. "Authenticated Records of the Distribution of the British Land and Freshwater Mollusca" in L. E. Adams' *The Collector's Manual of British Land and Freshwater Shells*, second edition, pp. 182–209.

There is also an explanation of vice-counties adopted from H. C. Watson's botanical system.

Adams acknowledges his indebtedness to Roebuck for these tables.

May, 1896. "A Label List of the Varieties of the British Five-banded Land Shells," by John T. Carrington.

Though only a catalogue of the varieties of *H. nemoralis* and *H. hortensis* it is perhaps worth placing on record with the complete lists that I am noting.

Carrington was the editor of *Science Gossip*, and in this paper gives a full and lucid explanation of the scheme for recording the band formulæ of the two *Cepæa.*

January, 1901. "List of British Marine Mollusca and Brachiopoda, prepared by a Committee of the Conchological Society."

The Committee consisted of Dr. G. W. Chaster, Rev. G. A. F. Knight, J. C. Melvill, and Dr. W. E. Hoyle.

This appeared in vol. x of this *Journal*, pp. 9–27, but it was not considered that the British area had been satisfactorily defined, and in the following year a second edition was issued separately, paged 1 to 20, and not published in the *Journal.*

In this the boundaries of the British area as defined in the list were accurately laid down and a map was given on the second page of the cover to illustrate them. On the third page of the cover there is a list of five species and forty-three varieties from Jeffreys' work that it was decided to omit. The alterations in this second edition were detailed in this *Journal*, vol. x, pp. 180–182, and there is a further report on pp. 280, 281.

April, 1901. "The Geological Distribution of Extinct British Non-Marine Mollusca," by R. Bullen Newton, F.G.S., in this *Journal*, vol. x, pp. 58–74.

July, 1902. "The Census of the British Land and Freshwater Mollusca," by Lionel E. Adams, in this *Journal*, vol. x, pp. 217–237.

October, 1903. "List of the British Non-Marine Mollusca," by B. B. Woodward, in this *Journal*, vol. x, pp. 352–367.

This is accompanied by a number of explanatory notes which introduce many of the names now stabilized on our lists.

1904. "List of British Non-marine Mollusca prepared by B. B. Woodward, F.L.S., etc., the varietal names added by Lionel E. Adams, B.A., and R. Standen. Published by the Conchological Society of Great Britain and Ireland. Price threepence."

This was an enlargement of Woodward's 1903 List, with a map added, published separately from the *Journal* and paged 1–10.

1907. "Illustrated Index of British Freshwater Shells," by Arthur G. Stubbs, consisting of three photographic plates with figures of fifty-six species, many of the "figures" giving two representations.

1914. "List of British Non-marine Mollusca prepared by A. S. Kennard, F.G.S., and B. B. Woodward, F.L.S., etc. Price fourpence."

Pages 1–12, of which the first four are a "Note on the Changes Necessary in the List of Non-marine Mollusca since its issue in 1904".

June, 1921. "Census of the Distribution of British Land and Freshwater Mollusca, by the late W. Denison Roebuck."

This Census forms no. 6 (pages 165–212) of vol. 16 of this *Journal*, known as the Roebuck Memorial number, and is accompanied by an excellent photograph of Roebuck and plates 3–7 illustrating in map form the distribution of each species. This number was drawn up by Professor Boycott.

27th March, 1926. "Synonymy of the British Non-marine Mollusca (recent and post-tertiary), compiled and annotated by A. S. Kennard, A.L.S., and B. B. Woodward, F.L.S."

Printed by order of the Trustees of the British Museum.

June, 1932. "The British Marine Mollusca, by R. Winckworth, M.A."

Published in this *Journal*, vol. 19, pp. 211–252. New names are proposed in it for two orders, *Decembrachiata* and *Octobrachiata*; two subgenera, *Clelandella* and *Similipecten*; and four species, *Odostomia scotica*, *Clione lebouri*, *Yoldiella tomlini*, and *Thyasira ferruginea*.

July, 1941. "List of the British Non-marine Mollusca, by A. S. Kennard, A.L.S., F.G.S.," in this *Journal*, vol. xxi, pp. 260–274.

The following Lists are undated:—

"Index to the British Land and Freshwater Shells arranged according to the systematic distribution in Gray's edition of Turton's Manual: published by W. Dearden, Nottingham. Price 3*d.*"

British Marine Shells, compiled by George Dixon, Ayton, Yorkshire, from Forbes and Hanley's "British Mollusca and their Shells".

A single large sheet printed by James Appleton, of Stokesley, undated.

"British Land and Freshwater Shells with Varieties": J. Grice, Belle Sauvage Works, Scarborough.

A single sheet undated.

"Label List of British Land and Freshwater Shells, price 1½*d.*"

A single sheet (*ca.* 1890), in the Naturalists' Gazette series issued by the Naturalists' Publishing Co., Birmingham.

"List of the British Non-marine Mollusca."

This 4-page, undated, and unsigned list was issued by B. B. Woodward for use in connection with his county catalogues in the *Victoria County Histories.*

"A Catalogue of British Recent Marine Shells, compiled chiefly from Jeffreys by C. M. Phelps." Single copies sixpence.

This is a very large single sheet, printed by Mason, of Tenby. It is undated, but probably appeared *ca.* 1880. I knew Phelps at Tenby when he was a curate at the Parish Church in 1881. See Dean in this *Journal,* vol. 20, p. 246.

Mason's "Guide to Tenby" is well known, but I have never seen a dated copy though I have examined several editions. Dean says that the sixth edition appeared in 1866.

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THE
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EDGAR ALLAN POE'S "CONCHOLOGIST'S FIRST BOOK"

By COLIN MATHESON,
Department of Zoology, National Museum of Wales

IN Dr. Wilfrid Jackson's recent memoir [5] on Captain Thomas Brown a brief reference is made to the charge alleged against Edgar Allan Poe, that *The Conchologist's First Book* published under his name for use in schools was an unacknowledged and almost verbatim copy of Brown's *The Conchologist's Text-Book.* The first (1839) edition of Poe's book [6] is exceedingly rare, but thanks to the generosity of Mr. J. R. le B. Tomlin we have a copy of it, and also of the rare first (1833) edition of Brown's work,[2] in the library of the National Museum of Wales. In correspondence with Mr. Tomlin I happened to mention this episode in Poe's career, and he suggested that a comparison between the two books, with a view to establishing the truth of the matter, might be of interest; the following notes are the result of this comparison and of a search through various biographies of Poe. To my colleague Miss E. H. Edwards, F.L.A., Librarian of the National Museum of Wales, I am much obliged for the trouble she has taken to obtain various works.

We may commence with a statement from Una Pope-Hennessy's biography,[7] that "Poe got into trouble for borrowing without acknowledgment from the works of Wyatt and Brown". We have not been able to consult Wyatt's work, or to find evidence that Poe got into trouble for plagiarizing from it, but in any case it seems from what has been published on the subject by Poe's biographers, including Miss Pope-Hennessy, that this author himself had no complaint against Poe. Wyatt's *Manual of Conchology* was published by Harpers in 1838, and in the Preface to the first edition of his own book (published in 1839) Poe states, writing of himself in the third person, that "To Mr. Thomas Wyatt, and his late excellent *Manual of Conchology*, he is also under many obligations. No better work, perhaps, could be put into the hands of the student as a secondary text-book. Its beautiful and well-coloured illustrations afford an aid in the collection of a cabinet scarcely to be met with elsewhere." This quotation should perhaps be read in conjunction with the following from Professor Woodberry's standard work,[10]— . . . "there can be no doubt that the real state of the case is given by Professor John G. Anthony, of Harvard College, who received his information from Wyatt. The latter said that as his work of the previous year proved too expensive for the public, and as Harpers refused to bring it out in a cheaper form, it was determined to publish a new book which should be sufficiently different from the former to escape any suit for the enfringement of copyright; and Poe was selected to father it. This is supported by the fact that Wyatt, who went about lecturing on the subject, carried the volume with him for sale. It was copyrighted in Poe's name, and appeared about April, 1839, when it was favourably noticed by the press. Poe shared the responsibility with others, for it will hardly be maintained that Poe was ignorant of the true character of the book to which he put his name." According to Woodberry, "the 'classification' . . . is reprinted from Wyatt's *Conchology*. . . . In the body of the work, the order, the nomenclature, and the descriptions of the shells are a paraphrase of Wyatt, at first close, but as the writer grew more deft at the phraseology more free; and the description of the animals is, as Poe stated, translated from Cuvier. The volume concludes with an original glossary and an index from Wyatt."

Poe's own version of the matter, in a letter of 16th February, 1847, from New York, quoted by John H. Ingram,[4] is as follows: "In 1840 I published a book with this title—'The Conchologist's First Book . . .' I wrote it in conjunction with Professor Thomas Wyatt and Professor McMurtrie, of Philadelphia—my name being put to the work, as best known and most likely to aid its circulation. I wrote the Preface and Introduction and translated from Cuvier the accounts of the animals, &c. *All* school-books are necessarily made in a similar way. . . . This charge is infamous." This letter of Poe's appears to have been written in reply to the charge of plagiarism from *Brown*, as made in the Philadelphia *Saturday Evening Post* and quoted later in this article. It will be noted that Poe refers to 1840 (when the second edition of his book appeared) instead of 1839, the year of publication of the first edition. Whatever we may think of this episode, it is clear that Professor Wyatt, at any rate, had no cause for complaint.

The charge of plagiarism from Captain Thomas Brown's *Conchologist's Text-Book* is on a different footing and has been reported in very different ways. Ingram in his biography of Poe, published in 1880, deals with the matter as follows: "An enemy, evidently he whose calumnies, under the guise of a 'Memoir', have overclouded the poet's memory ever since his death, spoke these words in the columns of the Philadelphia *Saturday Evening Post*: 'One of the most remarkable plagiarisms was perpetrated by Mr. Poe. . . . This gentleman, a few years ago, in Philadelphia, published a work on Conchology as original, when in reality it was a copy, nearly verbatim, of 'The Text-book of Conchology', by Captain Thomas Brown, printed in Glasgow in 1833, a duplicate of which we have in our library. Mr. Poe actually took out a copyright for the American edition of Captain Brown's work, and, omitting all mention of the English original, pretended in the Preface to have been under great obligations to several scientific gentlemen of this city. It is but justice to add that in the second edition of this book, published lately in Philadelphia, the name of Mr. Poe is withdrawn from the title-page, and his initials only affixed to the preface. But the affair is one of the most curious on record.'" Ingram goes on, "For the novice, Captain Brown's 'Text Book' may bear some resemblance to Poe's 'First Book', from the simple fact that both treatises are founded upon one and the same system; but the absurd charge, that one is, therefore, a plagiarism of the other can only have been made through gross ignorance or wilful falsehood."

Allibone, on the contrary, in a work [1] published ten years earlier than Ingram's, states, "There is a book in the market, entitled The Conchologist's First Book, by Edgar A. Poe, Phila., 18mo. This is in fact an almost verbatim reprint of Captain Thomas Brown's Text-Book of Conchology, Glasgow, 1833. We do not choose to dwell on the story. It will be found in the International Magazine, Oct., 1850 (340, n.), in which number was republished Griswold's Memoir of his late friend."

The truth, as shown by an actual comparison of the works, lies between these two versions ; there is, in parts, a much greater similarity between Poe's work and Brown's than can be accounted for merely by their being founded on the same classificatory system—but, on the other hand, Poe's work, from what has been said already, is obviously not "an almost verbatim reprint" of Brown's.

Woodberry says that Poe's "Introduction" (pp. 3–8) "is a close paraphrase from Brown's volume, the thoughts being identical in both, their sequence similar, and the authorities quoted the same". This seems to the present writer rather an overstatement, the thoughts not being identical to any greater extent, perhaps, than might be expected in the introductions to two volumes on the same subject, while their sequence is certainly not similar. The fact, however, that the concluding paragraph of Poe's Introduction (p. 8) is almost identical with the opening paragraph of Brown's Preface (p. ix), each consisting of a rather lengthy quotation from Parkinson and a shorter one from Bergman, is only one indication that Poe's Introduction owes a good deal to Brown. With regard to the "Explanation of the Parts of Shells" in Poe's book (pp. 9–20) there can be no argument—this is almost a word-for-word reproduction of the section similarly titled in Brown (pp. 15–27). Finally, all the shells figured in the twelve plates in Poe's book are reproductions from Brown (except in point of quality, the lithographic copies made by the Philadelphia firm being poor compared with the originals). The method adopted is interesting. Plates 1 to 4 in Poe, which are of a general nature, illustrating the various parts of shells, are exact reproductions of Plates I to IV in Brown ; the subsequent plates (5–12) in Poe's work, showing named examples of the various genera, appear at first sight to be quite different from Brown's, but comparison shows that the difference is due merely to reversing the sequence of the plates and the figures in them. Poe's Plate 5 corresponds to Brown's Plate XIX ; while figure 1, Plate 5, corresponds to figure 24, Plate XIX, and figure 21, Plate 5, to figure 1, Plate XIX, etc. Similarly Plate 6 in Poe is made up of figures from Plates XVIII and XVII in Brown, Plate 7 of figures from Plates XVII and XVI, and so on to Plate 12, made up from Brown's Plates XI and X. Five of Brown's Plates (V–IX) are not reproduced in Poe's book.

According to Una Pope-Hennessy, "Though it might be charged against Poe that the first twenty pages were a close paraphrase of Wyatt" (this as we have seen should be "of Brown") "he can hardly be blamed for the illustrations, which were taken from Brown's book, but by a decision of the publishers and independently of him". We have not been able to find the original authority for this statement, and need not inquire here how far, if correct, it can be regarded as dissociating an author from responsibility for a work issued under his name.

It is clear that someone—if not Poe then the compiler or compilers of part of the book to which Poe's name was to be put as " most likely to aid its circulation "—did without acknowledgment borrow some of his text, and all his plates, from Brown's *Text-book*. Edward Shanks is, unfortunately, only too correct in saying [8] that the business is " easily paralleled by scores of instances in the publishing of the times " ; but, he adds, Poe " was himself so fond of accusing others of plagiarism that this incident was greeted with delight by his enemies ". Whether the book was purely a piece of hackwork, or Poe had really any interest in conchology, it would now be difficult to say ; it seems, however, only fair to mention here Whitty's statement [9] that " In his criticisms in the *Messenger* Poe shows early knowledge on this subject ". Poe was associated with the *Southern Literary Messenger* about the years 1835–6, resigning his post of editor in January, 1837. The records of the books borrowed by him from the University library in his undergraduate days indicate an interest in various aspects of nature.

Both Brown's work and Poe's ran through a number of editions. The fifth edition of Brown's, like the first, was published at Glasgow in 1839 ; the place of publication of the sixth is given as " Edinburgh, etc.," 1845 ; and that of the ninth as " London, etc.," without date and described as " a reissue of the sixth ".[3] It is stated that there were also nine editions of Poe's book [7] ; the second of these (which I have not seen) was as mentioned above published in 1840, and according to Ingram the Preface to it reads as follows : " In issuing a second edition of this ' Conchology ' in so very brief a period since the publication of the first large impression the author has little more to do than to express the high pleasure with which he has seen his labours well received. The success of the work has been decided ; and the entire design has been accomplished in its general introduction into schools.

" Many important alterations and additions are now made ; errors of the press carefully corrected ; and the work, upon the whole, is rendered more worthy of the public approbation.

E. A. P."

The statement in the *Saturday Evening Post* that Poe's name was withdrawn from the title-page of this edition is denied by Ingram ; and Whitty by inference corroborates this, though he states that the third edition, issued in 1845, appeared without Poe's name.

If we have gone into this matter at some length it is because it seems advisable that a matter which concerns so prominent a figure as Poe, and about which so many contradictory statements have been made, should be cleared up as far as possible ; and also because the affair may not have been without its repercussions on the publication of the purely literary works on which his fame rests. Poe had always had difficulty in getting his work published, save in the magazines which he for the time being controlled. Some of his tales had been rejected more than once, while no publisher would consider producing a new collection in volume form. After his removal from Philadelphia to New York in 1844, "he collected together sixty-six tales, hoping that Harpers might accept them for omnibus publication. He could not approach Harpers himself, for the firm still owed him a grudge for editing the conchologist's manual that had driven their expensive book off the market, so he wrote begging Dr. Anthon to use his influence to regain favour with them. Dr. Anthon* . . . five months later informed Poe that he had called upon Harpers as requested and had accomplished nothing. They had 'complaints against you'. . . . *My own advice* to you is to call in person at their store. . . . The Harpers entertain, as I heard from their lips, the highest opinion of your talents." [7]

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* This would seem to have been Charles Anthon, one-time professor of Greek at Columbia University.

THE MOLLUSCA OF BEDFORDSHIRE

By Bernard Verdcourt.

The zoology of Bedfordshire (V.C. 30) has been much neglected in the past. Many younger workers have, however, started on various groups, and it is hoped that the fauna of the county will receive the attention it deserves. This paper is an attempt to fill one of the gaps, but must be considered of a preliminary nature.

The first published records of Bedfordshire mollusca are those in the *Midland Naturalist* for 1888–9. These were communicated by James Saunders, and were based on a few specimens found by his son. The *Victoria County History*, 1904, gives a list based on the previous one, together with new records. Many additions have been made by casual collectors, but I do not think that anybody has worked the county until I started to do so. I have started a collection of Bedfordshire mollusca in the Luton Museum, and specimens substantiating all my records may be seen there.

A short account of the geology, etc., of the county in so far as it affects the distribution of mollusca will be given. The solid geology is simple. Starting from the southern end of the county there are respectively bands of chalk, gault, lower greensand, and finally Oxford clay. The Ouse valley, west of Bedford, consists of Great Oolite bordered by a thin band of Cornbrash. The extreme western tip of the county is also of the same formation. The main drift formations in the south are boulder clay, chalky clay with flints, and gravel. Boulder clay and gravel are widespread in the north. The sandy centre portion of the county is the least productive of mollusca.

Beech woods occur only in the south and are small. The northern half of the county provides many very large oak woods, which have a characteristic fauna.

The main river is the Ouse, with its tributaries the Ivel and the Ouzel. The Lea yields few mollusca.

Notes about the List.

(i) The nomenclature is practically that of Ellis in his *British Snails*.

(ii) I have attempted to give a rather more definite meaning to terms used in describing distribution than is usual. Widely distributed means that the species has been found in two or more distant localities. Generally distributed means that it occurs in every suitable habitat. Local and fairly local refer to the number of localities in the county. The terms rare, scarce, frequent, common and abundant refer to the number of individuals found in a locality.

(iii) The comments are based mainly on my own records and I have only put the initials of an authority after a locality where I have not found the species myself.

Abbreviations : J.E.C., Mr. J. E. Cooper. C.C., Conchological Society's Census. V.C.H., *Victoria County History*. J.S., James Saunders.

Theodoxus fluviatilis (Linné). Apparently confined to the Ouse, in which it is widely distributed but not common. The shell is common in Holocene deposits in the Ouse basin.

Pomatias elegans (Müll.). The shells are locally very abundant in Beech woods and on chalk hills in the extreme south. Living specimens are rare : Luton and Barton. Probably the species is becoming extinct at the eastern end of the Chiltern hills. Living specimens are commonly found in Berks and Bucks. Shells are frequent in some woods on the Great Oolite, near Stevington. Var. *ochroleuca* occurs near Luton.

Potamopyrgus jenkinsi (Smith). Widely distributed and locally common. Var. *carinata* Marshall. Old Warden.

Bithynia tentaculata (Linné). Fairly generally distributed and common in rivers and streams, but less often found in stagnant water.

Bithynia leachii (Shepp.). Local. R. Ouse, R. Ouzel, Southill Lake. Frequent in the first locality.

Viviparus fasciatus (Müll.). Confined to the R. Ouse, in which it is frequent to fairly common. This species does not seem to associate with *V. viviparus*.

Valvata piscinalis (Müll.). Local. Frequent in R. Ouse. Old Warden.

Valvata cristata (Müll.). R. Ouse (J.E.C.). Old Warden. Local and not common.

Carychium minimum (Müll.). Abundant in some beech woods, but apparently local elsewhere. This species has no doubt been overlooked and is probably common in most moist places.

Lymnæa truncatula (Müll.). Local. R. Ouse.

Lymnæa palustris (Müll.). Widely distributed, somewhat local, and not common.

Lymnæa stagnalis (Linné). Widely distributed, somewhat local, but very common where it occurs. A var. *turgida ?* has been recorded from Luton by J.S.

Lymnæa peregra (Müll.). Abundant everywhere. Var. *oblonga* Jeff. is recorded from Limbury by J.S. He also records a var. *ampullacea* from Luton.

Lymnæa auricularia (Linné). Local. Common in the Ouse and the Ouzel. Luton Hoo Lake and Bramingam Pond. How the species came to be established in the latter very small pond I cannot make out. J.S. records a variety *minor* from Luton.

Ancylastrum fluviatile (Müll.). Local and rare. R. Ouzel at Leighton Buzzard. Occurs in Ouse gravels.

Ancylus lacustris (Linné). Somewhat local. Frequent in ponds in the Lea area. Fairly common in the R. Ouse. Seems to prefer calcareous soils.

Physa fontinalis (Linné). Frequent in R. Ouse. Luton Hoo Lake. Local.

Planorbis corneus (Linné). Widely distributed but local. Fairly common in the R. Ouse. Occurs in the Ouzel, where it was much commoner in former times judging by Holocene deposits. Some ponds near Luton.

In a pond near Stapsley, Luton, some with unpigmented body (F. C. Minns) : I have one specimen nearly adult with body rather pale blood-red and no trace of brown markings ; the eyes alone are pigmented.

Planorbis planorbis (Linné). Common in the Ouzel area. I have been unable to find the species in the R. Ouse, though it occurs in Holocene deposits near by. Harrold, Limbury, Flitwick, and Southill.

Planorbis carinatus Müll. Local. Common in R. Ouse. Old Warden.

Planorbis vortex (Linné). Widely distributed and common in most flowing water, but not common in stagnant water.

Planorbis leucostoma Müll. Rare. Ditch in Fancott Wood.

Planorbis albus Müll. Widely distributed, somewhat local, but fairly common where it occurs.

Planorbis lævis Alder. Very local and rare. Leighton Buzzard.

Planorbis crista (Linné). Local and rare, but no doubt overlooked. Limbury and Hitchin End (J.S.). Thurleigh Pond and Westoning.

Planorbis contortus (Linné). Widely distributed, somewhat local and never abundant.

Planorbis complanatus (Linné). As last.

Testacella haliotidea Drap. Recorded in the C.C., but I have been unable to find it.

Succinea elegans Risso. Recorded in V.C.H., but I have been unable to find it.

Succinea pfeifferi Rm. Frequent throughout county on river banks.

Succinea putris (Linné). Frequent in marshes, etc., throughout county. Sometimes associates with the last.

Vertigo antivertigo (Drap.). Very local. Totternhoe and Ampthill.

Vertigo substriata Jeff. This is recorded in the V.C.H. from Ampthill, but is not given in the C.C. Mr. Cooper informed me that the record should be queried.

Vertigo pygmæa (Drap.). Widely distributed, but local. Luton, Totternhoe, and Streatley.

Columella edentula (Drap.). "Local and rare," V.C.H. My searches have not yet produced any results.

Pupilla muscorum (Linné). Widely distributed, somewhat local, but frequent in very dry places.

Lauria cylindracea (da Costa). Local and seems to be confined to the north. Bedford (J.E.C.) and on most oolite walls.

Pyramidula rupestris (Drap.). Very local and rare. Bedford.

Vallonia costata (Müll.). Local. Barton.

Vallonia excentrica Sterki. Widely distributed, somewhat local, and not very common. In dry places.

Acanthinula aculeata (Müll.). Very local and rare. Long Wood, Studham.

Cecilioides acicula (Müll.). Very local, but no doubt overlooked. Dunstable Downs.

Cochlicopa lubrica (Müll.). Generally distributed, especially in beech and oak woods. Never abundant.

Azeca goodalli (Fér.). Widely distributed, but local and scarce. Bedford, Maulden, Barton, and near Luton.

Ena obscura (Müll.). Widely distributed, but somewhat local. It prefers beech woods, especially the flat kind which have a debris of twigs, such as occur in the south. Very local in the north. Bedford.

Punctum pygmæum (Drap.). Widely distributed, rather local, but abundant where it occurs.

Goniodiscus rotundatus (Drap.). Generally distributed throughout most of the county. Especially abundant in beech woods. Less common in oak woods and other habitats. Var. *alba* Moq.-Tand. Rare. Marston Thrift.

Arion circumscriptus Johnston. Very local. Luton.

Arion hortensis Fér. Abundant on cultivated ground throughout the county.

Arion intermedius (Normand). Bedford.

Arion subfuscus (Drap.). Bedford.

Arion ater (Linné). Generally distributed throughout the county. It is especially abundant in some areas. Seems much less variable than in other counties.

Balea perversa (Linné). Very local and scarce. Maulden Wood and Dunstable Downs.

Clausilia rugosa Drap. Fairly generally distributed, but the actual number present in any given habitat is very variable. Occurs in most woods, but is commonest in dry places near ponds where it seems to be gregarious. J. S. records a two-mouthed freak from Limbury.

Marpessa laminata (Mont.). Widely distributed. Occurs in most beech woods in the south which have steep chalky slopes littered with moss and twigs. I seldom find it in any other habitat. It is usually rather scarce. Bedford appears to be the sole locality in the north. Var. *albina* Moq.-Tand. Rare. Barton Leete.

Helicella itala (Linné). Occurs on dry chalk hills in the south, where it is locally extremely abundant, e.g. at Streatley, where the soil is of a peculiarly arid nature. Local and scarce in the north. Harrold, Thurleigh, and near Sharnbrook. Var. *lutescens* Moq.-Tand. and var. *hyalozonata* Cockerell occur, the former being as abundant as the type. Rimmer mentions a variety *minor* and some small adult shells from Streatley might be referred to this.

Helicella virgata (da Costa). This is much more generally distributed than the last species. It is also extremely abundant locally both in the north and south, e.g. Dunstable Downs and Thurleigh. In the former locality one colony consists of many hundreds of individuals. The species is scarcest in the non-calcareous parts of the county. Var. *lutescens* Moq.-Tand. is very common and var. *subalbida* Poiret occurs in the large colonies.

Helicella heripensis (Mabille). Local and scarce, Bramingham and Leagrave. Var. *lutescens* Kendall occurs in the former locality.

Helicella caperata (Mont.). This species, though never as common as its congeners, is rather more generally distributed and has fewer specific habitats. Var. *ornata* Picard, Leagrave ; var. *fulva* Moq.-Tand., Luton and Pegsdon.

Theba cantiana (Mont.). This is the commonest mollusc in the county. I never find it in woods, however. Its favourite habitats are rough meadows, hedgerows, and especially rubbish dumps. It is specially common in some areas.

Trichia hispida (Linné). Fairly generally distributed but never abundant. Chiefly in woods.

Trichia liberta Westerlund. This form, usually looked on as a distinct species, occurs at Bedford. Intermediates seem to occur and on the whole the distribution between this species and some varieties of *T. hispida* seems confused.

Ashfordia granulata (Alder). Local and rare. Limbury.

Helicigona lapicida (Linné). This species favours calcareous soils and is therefore restricted to the south, where the shells are local and scarce. Living specimens are most difficult to find.

Arianta arbustorum (Linné). This species seems to be curiously localized to certain areas. The actual ecological factors accounting for this are as yet unknown. The areas referred to are Toddington, Dunstable, and Leighton Buzzard. Very local elsewhere. Var. *alpestris* Ziegler. Totternhoe, J.S.

Cepæa hortensis (Müll.). Generally distributed and fairly common in most of the county. The commonest forms are *lutea*, 12345, 00000, (12345), and (12)3(45), and *carnea* 00000. This species often associates with the next species, but is occasionally entirely replaced by it. Var. *arenicola* Macgill. Luton.

Cepæa nemoralis (Linné). As last. The varieties are too numerous to mention. The reddish ones survive best in woods.

Helix pomatia Linné. Very local and rare. Luton.

Helix aspersa Müll. Generally distributed and common in gardens. Var. *flammea* Picard is common.

Euconulus fulvus (Müll.). Widely distributed, rather local and always scarce. Studham Wood, Bedford, Worley Wood, Old Warden.

Zonitoides excavatus (Alder). Very local and rare. Bedford. Well away from its usual type of habitat.

Zonitoides nitidus (Müll.). Widely distributed, rather local, but frequent where found.

Retinella radiatula (Alder). Widely distributed, rather local, and not common. Luton, Ampthill, Studham Wood, Ravensdell Wood, and Odell Wood (all oak woods). Var. *viridescenti-alba* Jeff is commoner than the type in Studham Wood.

Retinella pura (Alder). Local. Ampthill, Old Warden, Odell Wood, and Palmer's Shrubs.

Retinella nitidula (Drap.). Fairly generally distributed, but never abundant. Commonest in oak woods.

Oxychilus alliarium (Miller). Widely distributed, somewhat local and scarce. Luton, Fancott, Cockayne Hatley, etc.

Oxychilus helveticum (Blum). This species is limited to the larger oak woods, in some of which it is frequent. Also at Woburn.

Oxychilus cellarium (Müll.). Generally distributed and common.

Oxychilus lucidum (Drap.). Very local. Bedford, J.E.C.

Vitrea crystallina (Müll.). Fairly generally distributed and often locally abundant, especially in the Barton area.

Vitrina pellucida (Müll.). Fairly generally distributed, but never common.

Milax sowerbyi (Fér.). Apparently local. Luton and Bedford.

Agriolimax "agrestis" (Linné). A serious pest in most parts of the county. J.S. records a var. *sylvatica.*

Limax maximus Linné. Local. Luton.

Limax marginatus (Müll.). Local. Near Luton.

Limax flavus Linné. Widely distributed, but not common. In houses at Luton, Ampthill, etc.

Dreissena polymorpha Pallas. Frequent in some parts of the R. Ouse. Commoner in river mud.

Unio pictorum (Linné). Frequent in the Ouse.

Unio tumidus Retz. Widely distributed in both large rivers and lakes.

Anodonta cygnea (Linné). R. Ouse and lakes near Leighton Buzzard.

Anodonta anatina (Linné). Occurs in most large stretches of water.

Pseudanodonta minima Millet. Restricted to the R. Ouse.

Sphærium corneum (Linné). and *S. lacustre* (Müll.) are both common.

I have not yet tackled the genus Pisidium, and am just giving the list as it appears in the C.C. together with a few records.

Pisidium amnicum (Müll.). is fairly generally distributed.

Pisidium casertanum (Poli), *P. henslowanum* (Shepp.), *P. milium* Held, and *P. nitidum* Jenyns are recorded by J.E.C. from the R. Ouse.

The C.C. also contains the following species: *P. hibernicum* West., *P. obtusale* (Lk.), *P. parvulum* Auctt., *P. personatum* Malm, *P. supinum* Schm., and *P. subtruncatum* Malm.

It will be seen that certain species are absent from this list which occur in contiguous counties, and these will no doubt be recorded after further study.

I should like to express here my sincere thanks to Mr. J. E. Cooper and Mr. A. E. Ellis for the kind help they have always given to me so very willingly.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN AND IRELAND.

671st Meeting, held at the Manchester Museum, 6th November, 1943.

Mr. G. C. Spence, Vice-President, in the chair.

Exhibits.

By Mr. Fred Taylor: Varieties of *Helix hortensis* Müll., *Arianta arbustorum* (L.), *Theba cantiana* (Mont.), *Candidula caperata* (Mont.), *C. gigaxii* (Pfr.), *Cernuella virgata* (Da Costa), *Xerophila itala* (L.), and *Trochulus striolatus* (Pfr.), from Heytesbury, Wilts (coll. A. G. Stubbs): *Helix aspersa* Müll. (with bacterial disease) and *Phytia myosotis* (Drap.), from Newquay, Cornwall (coll. J. Armitage, 1943): *Cochlicopa lubrica* (Müll.) white variety, from Kingswood, Surrey (coll. F. Taylor): *Trochulus striolatus* (Pfr.), reversed form, from Chipstead, Surrey (coll. F. Taylor, 1943): *Pisidium personatum* Malm and *Lymnæa truncatula* (Müll.), from pond in Red Bank Wood, near Romiley, Cheshire (coll. F. Taylor, 1943).

672nd Meeting, held at the Manchester Museum, 9th December, 1944.

Mr. G. C. Spence, Vice-President, in the chair.

New Members Elected.

Edgar Pickard, 185 Village Way, Beckenham, Kent.
Andrew Stanley Cook, 8 Royston Avenue, Bentley, Doncaster, Yorkshire.
Rev. William J. Gregg, 8 Wheatfield Road, Belfast.
R. N. Gregg, 8 Wheatfield Road, Belfast.

Papers Read.

"*Limax flavus* L. in a 'wild' habitat," by A. E. Ellis.

"An interesting habitat of *Potamopyrgus jenkinsi* (Sm.) in North Cornwall," by Professor G. D. Hale Carpenter.

Exhibits.

By Professor G. D. Hale Carpenter: *Potamopyrgus jenkinsi* (Sm.), from Pentire Head, N. Cornwall, to illustrate his note.

By Col. C. J. F. Bensley: *Sphærium lacustre* (Müll.) var. from stream at Oswestry, Salop (June, 1944).

By Mrs. N. F. McMillan: *Planorbis corneus* (L.) from pond near Storeton, Wirral, Cheshire (coll. N. Ellison, May, 1943), and *Cecilioides acicula* (Müll.) from Hooton Park, Cheshire (coll. J. Armitage, April, 1942).

By Dr. J. W. Jackson: Internal "shell" of *Sepia officinalis* (L.) from salt-marsh, Holme Island, Grange-over-Sands, Lancashire (coll. A. E. Wright, May, 1944.)

By Mr. C. H. Moore: Species of *Bullia*: also *Hygromia hispida* and *H. striolata* from Ashwood Dale, Buxton.

By Mr. Fred Taylor: A beautiful series of varieties of *Helix hortensis* Müll., from Heytesbury, Wilts; also fine coloured drawings of the same (coll. A. G. Stubbs).

673rd Meeting (Annual General Meeting), held in the rooms of the Linnean Society, London, 24th February, 1945.

The President, Mr. A. E. Salisbury, in the chair.

Present: (Members) Messrs. A. P. Gardiner, R. Winckworth, A. S. Kennard, A. Blok, A. E. Ellis, A. Wrigley, L. W. Stratton, Dr. A. T. Hopwood, Dr. J. W. Jackson, and Lieut.-Col. A. J. Peile. (Visitors) Mrs. Winckworth and Mr. C. P. Castell.

Apologies for absence were received from Messrs. A. K. Lawson, G. C. Spence, B. Bryan, L. E. Adams, J. R. le B. Tomlin, Dr. H. E. Quick, Rev. H. Purefoy Fitzgerald, and Mrs. McMillan.

New Members Elected.

John Booth, 156 Milton Road, Weston-super-Mare, Somerset.
C. P. Castell, B.Sc., British Museum (Natural History).

Members Deceased.

H. F. D. Bartlett.   Mrs. L. A. Smith.

Members Resigned.

W. E. R. Hackett. E. A. Robins.

Annual Reports.

The annual report of the Council, and the reports of the Yorkshire and North Staffordshire branches, also that of the Recorder for Marine Mollusca were presented and adopted. The Hon. Treasurer presented his Financial Statement for 1944.

Officers and Council.

Owing to war conditions the Officers and Council last in office were re-elected.

Auditors

Mr. A. S. Kennard and Dr. A. T. Hopwood were elected Auditors.

The Society's Property.

In view of the Hon. Secretary's impending retirement from the Manchester Museum, a Committee consisting of Mr. A. E. Salisbury, Dr. J. W. Jackson, Dr. A. T. Hopwood, and the two Trustees, was appointed to consider the future of the Society's property and to recommend suitable action if necessary ; with power to act in case of emergency only.

President's Address.

The President gave an address on " Work and Workers on British Mollusca ".

Votes of thanks to the President, to the Linnean Society, and to the Manchester Museum were passed.

Exhibits.

By the President : A number of conchological books to illustrate his address.

By Mr. A. S. Kennard : *Acme* cf. *polita* from the Pleistocene of Hitchin.

By Mr. L. E. Adams : *Arianta arbustorum* (L.) vars. *canigonensis*, *flavescens*, and *baylei*, the product of the F2 generation obtained by mating a *canigonensis* with a *flavescens*. The F1 generation consisted of ordinary *arbustorum*. Bred by Charles Oldham in 1931 and presented to Mr. Adams who has now presented them to the Society.

ANNUAL REPORT.

This is the Sixty-Eighth Annual Report of the Society. Since the Annual Meeting of October, 1943, the Society has lost two members by death and two by resignation. Six new members have been elected.

Two Ordinary Meetings have been held at the Manchester Museum, viz. 6th November, 1943, and 9th December, 1944. Papers and short notes were read on each occasion and there were many interesting exhibits.

Three Journals have been issued, viz. vol. 22, no. 3, 29th December, 1943, no. 4, 29th April, 1944, and no. 5, 30th November, 1944.

The Hon. Secretary was the President of the Yorkshire Naturalist Union during the year and in December gave an address on " Martin Lister and Yorkshire Geology and Conchology ".

Mr. A. S. Kennard is the President of the Geologists' Association. He has been honoured by being selected to receive the Prestwich Medal from the Geological Society for his extremely valuable researches on the Pleistocene and Holocene Non-Marine Mollusca.

Mr. A. Wrigley succeeds Dr. A. T. Hopwood as President of the Malacological Society.

The additions to the Library have been fairly numerous and include books and papers on African non-marine mollusca from Mr. G. C. Spence ; Antarctic, Ceylon, and other papers from Dr. J. W. Jackson, and others from Mr. Alberto Carcelles.

Additions to the Cabinet comprise *Potamopyrgus jenkinsi*, North Cornwall, from Professor G. D. H. Carpenter; *Planorbis corneus*, Thingwall, and *Cecilioides acicula*, Hooton Park, from Mrs. N. F. McMillan ; and *Sphærium lacustre* var., Oswestry, from Col. C. J. F. Bensley.

EDITORIAL NOTES

We congratulate Dr. Jackson on being elected President of the Yorkshire Naturalists' Union. The Annual Meeting took place on 2nd December at Skipton, and the President gave an address on " Martin Lister and Yorkshire Geology and Conchology ", which was subsequently published in the *Naturalist*, January–March, 1945. Lister was born in Bucks and died at Epsom, but much of his published work was written at York during his residence there as a physician from 1670 to 1683. His records of recent and fossil mollusca are the earliest for Yorkshire, and in very many cases for Britain.

Dr. Jackson goes on to trace the development of conchology in Yorkshire and gives interesting details of noteworthy collectors.

The address is altogether a most able one and a mine of information.

Mr. Digby Firth has shown me an illustration of a medal awarded to J. Hebden at the Wakefield Industrial and Fine Art Exhibition in 1865, " for conchological specimens."

Dr. Jackson, in the *North-Western Naturalist* for December, 1943, has an obituary of Dr. W. M. Tattersall (with portrait), who was Professor of Zoology and Deputy Principal at Cardiff University College. He was a member of our Society and in 1920 published an important study on the life-history of *Littorina*, but he was mostly interested in the Crustacea and wrote largely on them, especially on the more neglected groups. He was born in 1882 and died in 1943.

One has often heard regret expressed at the lack of an adequate biography of Captain Thomas Brown (1785–1862), whose work on the British Land and Freshwater Mollusca, in the first half of last century, is so important.

Dr. Jackson has now given us, in the *Memoirs and Proceedings of the Manchester Lit. and Phil. Society*, vol. 86, session 1943–5, a first-rate account of his life and of his very numerous writings. He was a versatile man, but wrote mainly on birds and on mollusca, recent and fossil.

His books on birds frequently met with the severest criticisms, and even with the charge of piracy. Those on mollusca are largely known and stand on a much higher plane—this being the subject presumably in which he was most thoroughly versed.

I take the following list of some of his works from Dr. Jackson's admirable article :—

1816. *The Elements of Conchology*.
1818 (offprint 1817). " Account of the Irish Testacea " in *Mem. Wern. Soc.*, ii, pp. 501–536.
1823. Article on " Conchology " in *Encycl. Brit.*, ed. 6.
1827. *Illustrations of the Conchology of Great Britain and Ireland.*
May, 1833. *The Conchologists' Text-Book.* [1st ed.]
June, 1843. *The Elements of Fossil Conchology.*
1844. *Illustrations of the Recent Conchology of Great Britain and Ireland*, 2nd ed.
1845. *Illustrations of the Land and Fresh Water Conchology of Great Britain and Ireland.*
1849. *Illustrations of the Fossil Conchology of Great Britain and Ireland.* This had been appearing in parts since 1837.

Many important details are given by Jackson about the above.

Brown started life as an engraver, but when about 20 joined the Forfar and Kincardine Militia. Subsequently in 1838 he became curator of the Museum of the Manchester Nat. Hist. Soc., and was there till he died in 1862.

Mr. Firth tells me that he has a copy of Wodarch's *Introduction to the Study of Conchology*, 4th edition, dated 1831, instead of the usual 1832. It has coloured frontispiece and six plain plates.

Mr. Firth reports a copy of the official Catalogue of the Yorkshire Exhibition of Arts and Manufactures, Leeds, 1875. Included in the Machinery Department is no. 124: Fourteen cases of Brit. Land and Water Shells, J. W. Wilcock, 62 Northgate, Wakefield.

On p. 114 *supra* I referred to the British Nat. Hist. Society. In the *Proc. Malac. Soc., London*, vol. 26, p. 60, of last December, Mr. A. Wrigley has some interesting details as to this Society and its promoter, Edward Charlesworth.

By Mr. Firth's kindness I have two of the lithographed cards to which Wrigley refers before me, dated York, July, 1849, and May, 1850. The cards, which are beautifully executed, could be purchased at the rate of " three for six postage stamps ".

I am much indebted to Mr. Firth for the following addition to my " British Lists " :—

A large sheet headed " British Marine Shells ", and stated to be compiled from Thorpe's British Marine Conchology. It is undated, and was printed by W. J. Browne, Stokesley. It was probably issued by Dixon and Watson, who lived at Great Ayton, near Stokesley. A letter dated 19th October, 1863, from W. Watson, refers to a list of shells published by the writer.

The following additions to " British Lists " I owe to the kindness of Dr. Collinge and Dr. Hopwood :—

1892. " The Conchological Society's List of British Land and Freshwater Mollusca," compiled by Nelson, Roebuck, and Taylor.
Probably a reissue of the April, 1883, List.

1892. " A Catalogue of the Slugs of the British Isles by Walter E. Collinge."
Reprinted from *The British Naturalist*, 1892.

No date. " A List of British Land and Freshwater Shells," by Nelson and Taylor, compiled from Jeffreys with additions to date. May be dated approximately from the fact that it is printed at the office of the *Quarterly Journal of Conchology*.

No date. A Price List of Brit. Shells, Cabinets, and Requisites of all kinds for the use of Conchologists, etc., price one penny. Charles Jefferys, Naturalist and Taxidermist, Tetbury, Gloucestershire. [3¼ in. × 5¼ in.]
Date post 1887, since it lists C. J.'s " Complete Catalogue " of that date. Forbes and Hanley's is remaindered at 21*s*.

We have received from Pleiades Books, Ltd., of 11 Fitzroy Square, W. 1, an attractive volume by Eileen Mayo, entitled *Shells and How they Live*, price 5*s*. It consists of 33 pages all illustrated with either plain or coloured figures, and so copiously that about 112 species are figured, and an excellent index of English and Latin names is given. The latter appear to be very accurate and up to date, an unusual feature in a popular work of this kind. On the whole the figures are satisfactory, especially the plain ones, and mostly represent animal and shell as they appear in a living state.

The letterpress is terse and good, consisting of short paragraphs with such headings as The Foot, The Mantle, The Little Lid, Feeding, Siphons, Breathing, Byssus, and so forth.

We greatly regret to hear that during the war Lamy, Germain, Vayssière, and Vignal have died at Paris, and Pallary at Oran.

The list of Officers and Council is the same as last year and we have not, therefore, thought it necessary to republish it.

SNAILS OF THE AVON VALLEY, HAMPSHIRE.

By L. W. STRATTON.

BETWEEN September, 1939, and December, 1944, I lived at Ringwood, on the Hampshire or Christchurch Avon. Looking after evacuated children limited the time available for collecting, but I was able to do a certain amount along the Avon Valley, and also made a few excursions into Dorset. The following list of snails does not pretend to be exhaustive, and all were collected within some eleven miles of the valley, from two miles below Ringwood to three miles above Fordingbridge.

Theodoxus fluviatilis, *Hydrobia jenkinsi*, *Bithynia tentaculata*, *Bithynia leachii*, *Valvata piscinalis*, *Valvata macrostoma*, *Valvata cristata*, *Lymnæa truncatula*, *Lymnæa palustris*, *Lymnæa stagnalis*, *Lymnæa peregra*, *Lymnæa glabra*, *Ancylastrum fluviatile*, *Ancylus lacustris*, *Physa fontinalis*, *Planorbis corneus*, *Planorbis planorbis*, *Planorbis carinatus*, *Planorbis vortex*, *Planorbis leucostoma*, *Planorbis albus*, *Planorbis contortus*, *Segmentina nitida*, *Succinea pfeifferi*, *Succinea putris*, *Pomatias elegans*, *Vallonia pulchella*, *Cochlicopa lubrica*, *Ena obscura*, *Goniodiscus rotundatus*, *Clausilia rugosa*, *Marpessa laminata*, *Helicella itala*, *Cernuella virgata*, *Candidula caperata*, *Theba cantiana*, *Trichia hispida*, *Trichia striolata*, *Ashfordia granulata*, *Helicigona lapicida*, *Arianta arbustorum*, *Cepæa hortensis*, *Cepæa nemoralis*, *Helix aspersa*, *Euconulus fulvus*, *Zonitoides nitidus*, *Retinella nitidula*, *Oxychilus alliarium*, *Oxychilus cellarium*, *Vitrea crystallina*, *Vitrina pellucida*.

This list of fifty species is small, as the area abounds with likely habitats, and I probably missed a good deal. A notable absentee is *Lymnæa auricularia*, in its normal form, at any rate, for I failed to find it in the many parts of the river and its tributaries. Mr. E. St. John Burton found *Aplecta hypnorum* some years ago at Ringwood, and he showed me the exact locality, but though we searched together, and I searched many times afterwards, we failed to find it.

The area under review includes a small area of chalkland round Whitsbury, just north-west of Fordingbridge. Here *Pomatias elegans* occurs in abundance. *Ena obscura* can be found at the Miz-Maze, on ash, with *Clausilia rugosa*. I found a single specimen of *Helicigona lapicida* on each of several visits on the same ash tree in Steep Hill Lane, and on another ash near by I several times found *Marpessa laminata*, var. *pellucida*, but nowhere else. The normal form of the latter occurred on hazel near by. The small Down form of *Cernuella virgata* was also plentiful in this locality. Two interesting colonies of this snail occur at Ringwood, one on a bank on the Old Salisbury Road, within a few yards of the River Avon, the other on the embankment of the new road to Salisbury. Both colonies consist of the normal banded shells, and var. *lutescens*. They were probably imported with chalk material used in making the new road. The only occurrence of *Theba cantiana* was again in Ringwood, a small colony in a ditch on the outskirts of the town, an unlikely place to find this snail.

Among the freshwater shells two which may be of interest, and may be new records, are *Potamopyrgus jenkinsi* and *Valvata macrostoma*. The former may be found in a very swift stream feeding the Avon above Fordingbridge, where it occurs in vast numbers; and in a "drain" at Bickton, a mile below Fordingbridge. Here again the snails are plentiful immediately below a "hatch" on the main stream. They do not occur in slower "drains" near by. *Valvata macrostoma* is quoted by Mr. A. E. Ellis, *British Snails*, 1926, as being found at Christchurch, Hampshire. It can be found in ditches at Kingston, 5 miles, and in "drains" at Bickton, 12½ miles above Christchurch as the crow flies, but at least double these distances, by following the course of the river.

Lymnæa glabra I found in 1939 and 1940 in the Lyn Brook at Lynford, but was unable to find it later. This was its only locality. *Lymnæa peregra* is found everywhere, though generally small. In the Mill Stream at Ringwood; in a side stream at Wood Green, three miles above Fordingbridge; and at one or two places between there occurs a snail which appears to be that figured by Ellis as *Lymnæa auricularia*, var. *lagotis*. Those taken at Wood Green were of a fair size (21 mm. by 17 mm.) and were found with *Lymnæa peregra*, while some shells seemed to be gradations between the two. The Ringwood shells were again generally small, and I have two shells of this shape, measuring 15 mm. by 12 mm. and 14 mm. by 11 mm., taken from a trout caught in the River Avon.

TWO SOUTH AFRICAN SPECIES RENAMED.

By J. R. le B. Tomlin.

Triphora capensis Thiele described in the *Wiss. Ergebn. deutsch. Tief-See Exp.*, vol. xvii, p. 128, pl. 10, f. 18, 18*a*, 1925, from Great Fish Bay, Cape Agulhas, Francis Bay, and Algoa Bay, is preoccupied by *Triphoris capensis* Bartsch, *Bull. U.S. Nat. Mus.*, 91, p. 105, pl. 5, f. 4, 1915, from Port Alfred.

I rename Thiele's species *Triphora barnardi* after the able Acting Director of the South African Museum, Dr. Keppel H. Barnard.

Glypteuthria capensis Tomlin.

In 1932 I named a deep-sea shell thus, in *Ann. S. African Museum*, vol. 30, p. 165, text-fig. 6, and overlooked the fact that Thiele had used the same name, with a query, for a species from the Agulhas Bank, op. cit., p. 179, pl. 19, f. 27, 1925.

I therefore rename my species *Glypteuthria sculpturata*.

Limax flavus L. in a "wild" habitat.—Boycott (*J. Ecol.*, 22, 1934, p. 19), writing of this species, states that it "is domesticated to about the same degree as the house mouse or cricket, i.e. it lives inside houses, in yards, walls near houses, sheds, greenhouses, and gardens. I know of no record of its occurrence in England away from houses." In view of these comments, it seems to be worth recording the occurrence of *L. flavus* amongst limestone scree at the foot of Babbacombe cliffs, South Devon, between Long Quarry Point and Oddicombe, where I found it in September, 1944, in company with *L. arborum* B.-Ch., whilst collecting the rare woodlouse *Armadillidium depressum* Brandt. This particular piece of coast, although only about a mile from Torquay, is quite wild and unaffected by man, and not at all the sort of place where *L. flavus*, in view of its known predilection for domesticity, would be expected to live. (*Read before the Society, 9th December, 1944.*)

A. E. Ellis.

WORK AND WORKERS ON BRITISH MOLLUSCA

By A. E. Salisbury.

(*Presidential Address*)

Considering what I might offer as an address to the Members of this Society, I thought that it would be of interest to review some of the work and workers who have in the past contributed to the present knowledge of our subject which has in recent addresses to our sister Society been so ably stated by its President.[1] I propose, however, to confine myself mainly to Conchologists of British nationality.

I suppose that James Petiver, who lived about 1658 until 1718, was the first to leave anything like a treatise on our Natural History in his *Opera historiam naturalem spectantia*, or, as it is referred to generally, the "Gazophylacium". Martin Lister,[2] in the reign of Queen Anne, published his *Historia Conchyliorum*, of which William Huddesford, Keeper of the Ashmolean Museum, edited a new edition in 1770. It is stated that Lister's illustrations were from drawings made by his daughters Susanna and Anne of specimens in this collection. The plates of this work are referred to by many writers on the subject. Lister was the son of Martin Lister, Physician to Charles I, and himself became Physician-in-ordinary to Queen Anne. He was born in Buckinghamshire, and probably lived from 1638 until 1712. Lister intended to work out the anatomy of all the species which he could obtain, but ill-health prevented this scheme being carried out. Even so this is some of the first work to be done on the anatomy of Mollusks. But the work which it has been decided should be our foundation stone is the tenth edition of the *Systema Naturæ* of Linnaeus in 1758. Of this *Systema* several editions [3] were published during the closing part of the eighteenth century, the twelfth edition and the one universally referred to as Gmelin being the most important. These early works have to be consulted by students of any fauna, since in them are many of the earliest names, including many which are applicable to species occurring in and around our islands. Peter Ascanius, writing from Stockholm in 1772, gives us one of our earliest generic names, Philine; the figures show parts of the "animal", which is worth noting at this early date. The species he describes from Norway is the same as our British form. The next writer who concerns us is Constantine John Phipps, second Baron Mulgrave, who in his *Voyage Towards the North Pole*, published in London, 1774, describes a Pteropod *Clio limacina*, which we now know under the generic name of *Clione*, proposed by Peter Simon Pallas in his *Spicilegia Zoologica*, which was published in 1774. O. F. Müller, in his *Zoologiæ Danicæ Prodomus*, treating of a fauna so near at hand, had a certain bearing on our British list. The next English work was that of Thomas Pennant,[4] who in 1766 published at his own expense a folio edition (the first) of his *British*

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[1] A. T. Hopwood, *Proc. Malac. Soc.*, xxvi, pp. 29–47.

[2] Since writing the above a mémoire on Martin Lister has been published, vide Jackson, *Naturalist*, Jan.–March, 1945, pp. 1–11.

[3] For full list see *Catal. Works Linnaeus Brit. Mus.* (*N.H.*), 1907.

[4] Vide Iredale, *Proc. Malac. Soc.*, xv, 1922, p. 80.

Zoology. This did not deal with the Mollusca, but it is interesting to note that the first (folio) edition was issued at 11 guineas as a philanthropic gesture, solely to benefit the Welsh Charitable Institution in London. An edition was published in London and Chester from 1768 to 1770, running to four volumes, price £1 16*s*., but the fourth volume contained only corrigenda and addenda, and it was not until the fourth edition that the Mollusca were dealt with at all. This edition was issued from London and Warrington, 1776–7 ; the former contents were now rearranged, the addenda and corrigenda inserted in their proper places, and the fourth volume, which was entirely new, was devoted to the Mollusca ; it has been said that this volume was the work of Pennant's son, who also bore the name Thomas. There were two editions of this printing, an octavo and a quarto, in which, while the contents are the same, the pagination differs. In the octavo edition "volume four" consists of 154 pages of text and two pages of corrections, with plates i to xciii ; whereas in the quarto, owing to rearrangement of type and pagination, there are only 136 pages, with the addition of two pages of corrections as in the octavo.

In 1812 a further octavo was issued containing 379 pages, and the fourth volume, which again is the one containing the Crustacea Vermes and Mollusca, a page of errata, and plates now numbered i to xcv ; these plates have some additions, namely xxii, xxvii, and xxxviii, which throw the numbering out as compared with the former edition ; there is a non-consecutive run of plates in this last issue from lxxiv to lxxxiii, and, comparing them with the 1777 edition, we get the following :—

1777 *edition*		1812 *edition*
lxxi	becomes	lxxiv
lxxii	,,	lxxv
lxxiii	,,	lxxvi
lxxiv	,,	lxxvii
lxxv	,,	lxxviii
lxxvi	,,	lxxix
lxxvii	,,	lxxx
lxxviii	,,	lxxxi
lxxix	,,	lxxxii

These plates are arranged in the following order : lxxiv, lxxxii, lxxvi, lxxv, lxxviii, lxxix, lxxx, lxxvii, lxxxi, which is rather disconcerting if one is not aware of the fact. In my copy of 1777 there is a plate numbered xciii of Ophidium, and the plate is marked BR. ZOOL. III APPENDIX. The frontispiece is the same in both editions. To a number of these differences attention is called by "the Editor" on pages 379 and vii, and a list of plates is given on the following eight pages, ix–xvi.

Attention is also called to the fact that the paragraphs marked with an asterisk in this 1812 edition are by the Rev. Hugh Davies ; these are mostly if not all descriptions of the species. The "Editor" may well be the son mentioned earlier, namely Thomas Pennant, Jnr. Hugh Davies is, in all probability, the man who wrote the *Systematic Catalogue of the Native Plants of the Isle of Anglesey* ; he lived from 1739 to 1821, and was associated with Pennant in the latter's work on Indian Zoology. Thomas Pennant the elder lived 1726 until 1798.

Types mentioned in the above work are in the British Museum collections.[1]

I have dwelt upon this author at some length because one finds references given which do not specify the edition.

During the years between the publication of the first and last editions of Pennant other works dealing with the subject appeared, two of them in the same year, 1778, namely Born's *Index rerum naturalium Musei Cæsarei Vindobonensis*, an octavo work, and *Historia Naturalis Testaceorum Britanniae*, or *The British Conchology*, in English and French, by Emanuel Mendes Da Costa. A doubt as to which should hold priority has not been solved so far as I am aware. Plates in this *British Conchology* numbered 8 and 17 have the figures reversed, and in plate 3 the numbering does not agree with the text, but the error is set right in the " Explanations ".

From notes made by Winckworth in his preparation of the List of British Marine Species, and which he kindly placed at my service, I see that he considered the binomial nomenclature in the bivalves to be perfectly regular, in the univalves there occur a few irregularities, such as quoting a second name, for example, p. 33, *Cypræa pediculus* seu *Monacha* . . ., and again, p. 110, *Strombiformis bicarinatus* seu *Torcular.* The first name is new, the second from Argenville modified. This is not a British shell.

Trochus terrestris is used for three species, pp. 35, 36, but these are merely quoted from Lister, Maton, and Pennant, and are shells which Da Costa had not seen (preface, p. xi).

Among generic names three have " double " names, but as Winckworth's notes record, these are on a par with the Linnæan subheadings, " Patellae apice perforata," etc. In Da Costa's index to the work all the species with the double names in text are quoted as *Buccinum.*

The collection and manuscript of this work apparently passed into the hands of Donovan from remarks in the latter's *British Shells.* Donovan's work may therefore be referred to in order to clear up any difficulties which might trouble the reader of Da Costa's work.

Of Born's work it would seem (as far as British species are concerned) that the only names which clash with those of Da Costa are (synonyms) *Trochus papillosus* Da Costa = *Trochus granulatus* Born and (homonyms) *Turbo carinatus* Da Costa 101 and *T. carinatus* Born 361.

Relative to the authorship of the anonymous *Conchology* of 1770 or *Natural History of Shells* a good deal has been written as to whether Da Costa or Humphrey (or both) was the author, and a letter from George Humphrey to William Swainson[2] is the subject of a paper in our Journal. The author of this paper is mistaken in supposing that the misidentifications by Da Costa (= D.C.) are in the latter's *Hist. nat. Test. Brit.*, 1778 ; Humphrey is referring to the *Conchology*, 1770, as will be seen if passages and figures quoted are compared with the work itself; it will be found that there can be no doubt as to what work the writer of the letter means; he gives "Da Costa" or "D.C." as the *author of the statements* quoted throughout the letter, and he corrects these statements where he considers it necessary to do so; had the writer of the letter been the author or even part-author he would not have written in this strain. The remark "The Patella *published* by me" (the italics are mine) is quite in keeping with this view because Humphrey was one of the individuals from whose house the parts *were* published, so that he was quite entitled to say so; and as a man of business he naturally would not advertise the fact that the issue could be obtained elsewhere. I therefore unhesitatingly say that this letter is *direct* evidence that Da Costa was the sole author of the "anonymous" Conchology.

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[1] *Vide* E. A. Smith, *Journ. Conch.*, xiv, p. 38.

[2] Jackson, *Journ. Conch.*, vol. 20, Sep., 1937, pp. 332–7. *Vide etiam* Iredale, *Proc. Malac. Soc.*, vol. xi, 1915, pp. 307–309, and Sherborn, *Ann. Mag. Nat. Hist.* (vii), vol. xvi, pp. 262–4, Aug., 1903.

Only six parts were published with 17 plates, and it was later stated that it was owing to "the work not meeting with support from the public" that it was so abandoned, but there may have been another and perhaps true reason for its early end, namely the inability of its anonymous author to continue to supply the MS. owing to his incarceration for some considerable time, 1767–1772. It is on record that his library and collections were seized and sold by auction in May, 1768; Da Costa left a daughter, and he died at his lodgings in the Strand in May, 1791. Apart from all this definite evidence one reads on the title page as follows :—

"London: Printed for the author by T. Jones of Fetter Lane/and sold by Mr. B. White, Bookseller in Fleet Street, Mr. Elmsley, Bookseller in the/Strand, and Mr. Humphrey, Dealer in Shells, and other Natural Curiosities, in St. Martin's Lane near Charing Cross."

This clearly indicates that Mr. Humphrey is a different person to "The Author"; and again we read at the end of the preface :—

"If they [Collectors] will honour the Editor to send them [specimens] either to the Booksellers Messrs. White and Elmsley, or to Mr. Humphrey, to be conveyed to him, he [The Editor] will return them safe. . . ."

Again differentiating between The Booksellers and Mr. Humphrey and the Editor. Regarding these passages it makes one wonder how the question arose as to authorship.

I have taken the above notes from the copy in the British Museum, a cover of one of the parts and a page in the possession of Winckworth, and from my own copy which unfortunately has none of the covers to the parts preserved with the ii, and 26 pages of text and the xii plates. These plates were drawn by J. Wickstead, jun., and engraved by P. Mazellas to plates i–iv and vi. Plates v–vii were drawn by "W. Humphrey" and the remainder by "P. Brown", the engraver being the same for all. Iredale calls attention to these points in the article before mentioned. Humphrey's letter, the subject of Dr. Jackson's article, however, settles the question once and for all as to which of the two (Humphrey or Da Costa) was the author. And finally I might add that there seemed to be no doubt at the early part of last century, for the work is quoted as being by E. M. Da Costa; as, for instance, in the list of writers on Conchology given by Burrow in his *Elements of Conchology*, 1818, p. 215.

In the years 1779 and 1780 we have the writings of two foreign authors which affect the British fauna to a small extent, these works being two more essays by O. F. Müller and two by Fabricius, one the *Fauna Groenlandica*, bearing date 1780, the others 1772. Müller added yet another volume to his *Zoologica Danica* in 1784, with further figures and descriptions of species first described by him in 1776.

I would now refer to that very interesting Catalogue quoted as by Solander, I mean that rare book under the title of *A Catalogue of the Portland Museum*. It would not seem to be quite so rare as was previously supposed, judging from the fact that more than one copy has turned up of late in the market. This book was described and summarized by Iredale in 1916,[1] when he gave a list of available names. A priced Catalogue was, subsequent to the sale of the Duchess's Museum, issued by the Auctioneers, giving the prices and purchasers' names, " enabling every Connoisseur to know among whom these valuable Curiosities are distributed, and the Sum which every Lot produced." [2] A further copy has recently been purchased at the shop of Messrs. Bumpus by Dr. A. Tindall Hopwood, one of our members ; this copy has the frontispiece by Burney, which was " Executed under the direction of J. Bell,[3] Bookseller to His Royal Highness the Prince of Wales, London, April 8th, 1786 ", which is included in all copies and a plate has been inserted, this being of a bust of " Lady Margaret Cavendish Holles Harley, Dutchess Dowager of Portland. Published April 18th, 1786, by G. Humphrey No. 48 Long Acre ". This insertion and the fact that it was published by G. Humphrey and in the year of the sale suggests that this copy may have originally been supplied by George Humphrey himself, who was actually the author of the Catalogue. It is evident that Humphrey had an idea of producing the plate of the Duchess with a view to its sale either together with or in addition to the Catalogue, as it will be noted that this plate is dated in April, two months in advance of the great sale. Dr. Hopwood's copy also has the separate Catalogue of 103 lots which was issued by Messrs. Skinner and Co. for the 39th day of sale, following on 8th June, 1786, immediately after the end of the main portion of the sale, which ended on the 7th June, so that this 30th day was foreseen and provided for with its Catalogue complete, and added £559 7*s.* to the total. There were four items in addition to the 103 given in the Catalogue of this day and which are mentioned in the priced Catalogues as " Out of Cat." These four items were purchased by " Jones, Tyson, Rundell and ditto " respectively, and fetched £5 15*s.*, £1 1*s.*, £2 12*s.* 6*d.*, and £1 10*s.*, thus making up £10 18*s.* 6*d.* of the £559 7*s.* above mentioned. The only item which has any reference to Mollusca whatsoever in the

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[1] T. Iredale, *Proc. Malac. Soc.*, xii, 1916, pp. 86–93.

[2] Salisbury, *Proc. Malac. Soc.*, vol. xviii, p. 31, 1928. There is an unfortunate printer's error in the fourth line from the end of the second paragraph, where the figures 8 and 7 have become transposed, the date should read, of course, 1786.

[3] One of the Proprietors of the *Morning Post*.

39th day's sale was lot " 47. A large piece of agate . . . wrought in the shape of a turbo ".

In the *Morning Post* dated the 7th of March, 1929, it is stated that the third Duke of Portland bought the Barberini Vase (known as the Portland Vase) for 980 guineas, whereas the priced Catalogue issued by the Auctioneers states that the purchaser was a Mr. Tomlinson, who acted on behalf of the Duke of Marlborough.

A letter stuck on to the front flysheet of the Hopwood copy from the bookbinder Charles Elliott states that the edges of the Catalogue were merely " scraped " ; the bookbinder had instructions not to cut the edges but he thought that scraping them would make the bound book look neater, so he did not follow the owner's instruction exactly, much to the owner's annoyance, I should imagine ; but as the edges were merely " scraped " I take it that we can assume that the size of the Catalogue as issued was approximately 10 in. by 8¼ in., a full quarter-inch larger each way than my largest copy. All this does not affect British Conchology, except for the fact that the issue was by an English author and the book does provide a number of Molluscan names by either Solander or Humphrey, so that these remarks are perhaps not exactly misplaced here. All the Sale Catalogues appear to have been numbered ; in my own library are Nos. 30 and 65 ; Dr. Hopwood's copy is No. 155. On the last flysheet of this copy is a cutting from the *Gentleman's Magazine*, which states that the total of the sale was, without the supplement, £10,973 15*s*., the supplement [the 39th day], £550 8*s*. 6*d*., making a total of £11,524 4*s*. Neither of these figures are, however, in agreement with the priced Catalogue and summary thereof issued by the Auctioneers ! Also there occur errors in the figures given in manuscript in the Hopwood copy, rather indicating that it was priced by someone actually attending and during the bidding at the sale, and this is rather confirmed by the fact that only in certain instances are the purchasers' names written in.

Retzius, in his *Dissertatio Historico-naturalis sistens* NOVA TESTACEORUM GENERA, gives us the name *Unio* for certain of our freshwater bivalves. This work, published at Lund, 1788, was followed in 1790–1792 by J. G. Bruguière, *Encyclopédie Méthodique*, which, in spite of its fame, concerns us little, if at all, as regards the British lists. L. Spengler proposed the name *Mya norvegica* from a Norwegian locality, which name appears to be a form different from our own, which is named *arctica* Lamarck (No. 153 Winckworth list).

W. G. Maton was a doctor who lived between the years 1774 and 1835, and in 1797 wrote a paper on " Observations on the Natural History of the Western Counties ", published at Salisbury, in which he proposed the name *Turbo rudis* for a form of *Littorina saxatilis* Olivi. This shell (*rudis*) was figured by Donovan ; he received the specimen from Dr. Maton, who had collected it from the River Tamar, near Bere Alston, and which Winckworth says in his manuscript notes is quite obviously the muddy estuarine form, judging from the figure, which is very good.

A little illustrated list comes from the pen of John Adams in the same year. I have not been able to find who this gentleman was, but probably a member of the Linnean Society, as in their *Transactions* for 1797 he writes on " The specific characters of some minute shells discovered on the coast of Pembrokeshire ", but unfortunately (or may be fortunately) these species are indeterminate, the descriptions are said to be poor, and the figures, which are reversed, are " miserable ".

Cuvier, or to give him his full name, Georges Léopold Chrétien Frédéric Dagobert, Baron Cuvier, flourished 1769 to 1832. In his *Tableau élémentaire de l'histoire naturelle des Animaux*, published in 1798, he provides the name *Lima* with the sole example of *Ostrea lima* L. and therefore type of the new genus.

A George Adams in 1787 wrote a treatise of upwards of 740 pages, with plates on the Microscope, which he calls Essays thereon. This Adams lived 1750–1795 and was (?) the son of George Adams (1720–1773), who wrote *Micrographia Illustrata* on similar subjects. F. Kanmacher edited a second edition of the younger Adams's work in 1798 from London, as was the first edition, adding to it in the first part of chapter xi (p. 629), " An arrangement and description of minute and rare shells." The figures given on plate xiv and their descriptions are from Walker and Boys' *Testacea minuta rariora*, of 1784, to which Kanmacher added binominal names, as he says " from Mr. Jacob's own corrected copy of the work " (note p. 633). Montagu received specimens of many of the species from Boys, and his descriptions frequently make it clear what the species mentioned in " Walker and Boys " really are. As the book is rare it may be worth while here recording that the names of Kanmacher are to be used in the cases of *Clathrus clathratulus* (103), *Graphis albida* (106), *Alvania crassa* (58), *Retusa alba* (239) ; the bracketed numbers refer to Winckworth's marine list.

To close the century, in 1799 appears the first work of that great systematist Lamarck, whose bicentenary was celebrated on 1st August last, and who first instilled ideas which led gradually to the shell and the soft parts of the Mollusk being studied together as constituting an organic whole. It is not often realized how much the soft parts were disregarded by the earlier writers, and it was to the shells as things apart from the soft parts that names were given, the soft part or " animal " so called was named separately. Linnæus consistently does this, saying that the animal of a genus of shells is a *Tethys*, a *Doris*, a *Limax*, and so forth. It has been a matter of evolutionary thought, perhaps somewhat unconsciously, which has developed the idea that the shell and the soft part are integrals of one and the same *living* being, and neither the one nor the other part can live if its complement is removed, and we all know what a different looking object a shell can be if it is collected living or if it has been dead for any considerable time. It is rather curious to us in our day to reflect how long this idea of the separate identity of shell and soft part was maintained. It is recorded by J. Gwyn Jeffreys [1] that the statement by Searles Wood that the shell is " part and parcel of the animal itself " was " controverted by high authority, and especially by Dr. Gray. . . . He, at one time, disturbed the minds of geologists as well as students not a little by a statement that some shells which were perfectly alike were inhabited by animals so extremely dissimilar as to be referable to very different orders of Mollusca". Jeffreys goes on to say that he "qualified" this statement later by admitting that "in the distinction of the larger and smaller groups of Mollusca, the characters derived from the animal, the shell, and the operculum, which all have a mutual relation to each other, are of equal value and constancy" and "how thoroughly they depend on each other". I must be excused for quoting at some length but have done so as I feel sure that it is not realized how slowly the evolutionary idea progressed, and the influence of Cuvier, Poli, Moquin-Tandon, and other anatomists started the train of thought which connected shell and soft part as one and the same organism. I am aware that there are those who would reject Poli's nomenclature on the grounds that he gave a name to the shell and one to the soft part or "animal", but I fancy this was contributory to the idea of unity of shell and soft part, especially when one notes the (deliberate, no doubt) similarity of these respective names. Therefore the author is to be commended rather than otherwise, and I see no difficulty in deciding which of his names has priority according to our modern usage.

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[1] *British Conchology*, vol. i, intro., p. xiii.

Jean Baptiste Pierre Antoine de Monet de Lamarck, whose dates were born 1744, died 1829, gave us many genera in his "Prodrome d'une nouvelle Classification des Coquilles", published in *Mém. Soc. Nat. Hist.*, Paris an vii (May, 1799), pp. 63–91, and in his later work, *Système des Animaux sans Vertèbres*, Paris, Jan., 1801, which are based greatly on the study of the soft parts in conjunction with the shelly portion of the animals. These generic names are accompanied by example in each case which although not mentioned as a generic type, as we understand the term, yet in the case of a new genus this species being the only one mentioned stands as type.

In 1799 we find R. Pulteney contributing to the new edition of *Hutchins' History of the County of Dorset*, a Catalogue of the shells of the county. This was a folio edition, and is interesting in that names are proposed, but owing to a statement on the title page [1] that it was privately printed these names, when new, are quoted from later authors by Winckworth in his list. Iredale expresses the opinion that these names in any case would not be as of Pulteney but of Rackett, who later published an emended edition of Pulteney's work with additions and plates, these plates being those of Da Costa with some alterations and additions; the new plates are i, iv, v, xiii, xviii, and xix. In all there were twenty-four plates of shells.[2] The sale of Pulteney's collection took place in 1863, and as Pulteney died in 1801 at the age of 71 his collections remained in the hands of his family for over fifty years. The question arises as to whether these names should be ascribed to Pulteney or to Thomas Rackett; the case is a parallel one to that of Leach and Gray. As regards the alterations of Da Costa's plates, Dr. Cox, in his article in *Proc. Malac. Soc.*, gives in tabular form on which plates alterations occur. Relative to authorship, Montagu [1] says of the Catalogue, . . . "has been given in Hutchins' History of this County." Rackett's edition did not appear until 1812.

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[1] *Vide* Iredale, *Proc. Malac. Soc.*, xi, 1915, p. 333. *Etiam* Reynell, *Proc. Malac. Soc.*, xii, 1916, pp. 43–4.

[2] *Vide* L. R. Cox., *Proc. Malac. Soc.*, xxiv.

In 1799 Edward Donovan, when 31 years of age, commenced his *Natural History of British Shells*, and completed it in 1804; it was issued in sixty monthly parts of three plates each. Maton and Rackett, in a paper read by them before the Linnean Society in 1803, say that five volumes *have appeared*, comprising 180 plates. It may be that this was added to the proofs of the paper, which was printed 1804, or it should perhaps have read "will appear", because they went on to say "not yet completed". However, we are probably correct in assuming the parts were issued as in the following table:—

1–6	with plates	1–18	in 1799
7–18	,,	19–54	,, 1800
19–30	,,	55–90	,, 1801
31–42	,,	91–126	,, 1802
43–54	,,	127–162	,, 1803
55–60	,,	163–180	,, 1804

Montagu, in his preface to his *Testacea Britannica* (1805) states that four volumes of the five "have already been laid before the public", and quotes plates up to 136 and to page 414, but plate 138 is not quoted until Montagu's Supplement, at p. 99, published 1808. These facts agree very well with the table above.

While the above work of Donovan was proceeding, William Wood [2] published a paper "Observations on the Hinges of British Bivalve Shells", in which he describes, but does not name, a new shell.[3] It is the *Venus pullastra* of Montagu (= *Paphia pullastra*). George Montagu was born in 1755, and died at the somewhat early age of sixty in 1815. He wrote on Ornithological subjects as well as Molluscan. He lived, for some time at least, at Knowle, a little village near Barnstaple, Devon. He is stated in the *Dictionary of National Biography* to have been a Captain in the Army, but he is frequently referred to as Colonel Montagu in literature; he was a fellow of the Linnean Society.

In 1803 he wrote the main part of *Testacea Britannica or History of British Shells, Marine, Land, and Freshwater, including the most minute; systematically arranged and embellished with figures.* The preface of this first part is dated from Knowle, 1st September, 1803, and it was published in December of the same year. The Genera are all Linnean with the exception of *Balanus* Brug. 1789, *Pecten* Müller 1776, and *Vermiculum* Montagu 1803—this, a new genus, has as first species *incurvatum* Kanmacher 1798, which is a *Cæcum*; most of the species are, however, Protozoa. It is not the *Vermaculus* of Meuschen 1787.

On p. ix Montagu calls attention to Donovan's work, which was proceeding at the time when Montagu was preparing his own work, and goes on to say that "duplicates" will occur and that some species he intended to describe have been anticipated by Donovan. Montagu remarks here that "little more than two volumes of Donovan's work had appeared when his own plates were engraved": this would indicate that Montagu's work was ahead of Donovan in MS., although Donovan caught him up somewhat in publication.

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[1] *Vide* G. Montagu, *Test. Brit. Intro.* 1803, p. vii.

[2] *Trans. Linn. Soc.*, vi (1802), art. xiv, pp. 154–176, pls. 14–18.

[3] Tom. cit., p. 175, pl. xvii, 13–14.

The footnote on p. xii is also interesting in that it refers to "a nomenclature by Doctor Solander, of many minute shells he had sent to Bullstrode for the Dutchess of Portland". How much this "nomenclature" is connected with the naming in the "Portland Catalogue", of course, one cannot say.

In a letter written subsequently to his work Montagu deplores attempts at augmenting the list of British species (by which I take it he means what we call "splitting"), and goes on to lament the too easy credence which he gave to accounts of some of his friends. Bean wrote, too, that it was well known that conchologists shamefully imposed upon Montagu, and Leach, examining shells which had been in Montagu's possession, took fragments of foreign coral from them. Jeffreys wrote of General Bingham that he was notoriously imposed upon.

In 1804 Montagu published in the *Trans. Linn. Soc.* a paper describing some Nudibranchs, in which he describes *Laplysia viridis* amongst others. Here I might call attention to the clashes in dates between Donovan and Montagu's *Testacea.* Montagu, as we have already noticed, published his book in December, 1803, but we are not sure whether after page 154 Donovan's work should be dated as 1803 or 1804, so that we have to decide between the following names :—

	Donovan.	*Montagu.*	*Winckworth. List.*
pl. 136	*Murex angulatus* (non Sol.)	*Murex turricula*	(212)
159	*Turbo reticulatus* (non Kn.)	*Murex udversum*	(198)
165	*Voluta lævis*	*Cypræa voluta*	(183)
169	*Murex emarginatus*	*Murex gracilis*	(224)
178	*Turbo vittatus*	*Turbo cingillus*	(57)
178	*Turbo pallidus* (non Mont. 1803)	*Turbo crassior*	(38)
179	*Buccinum brunneum*	*Buccinum minimum*	(206)
179	*Murex elegans*	*Murex linearis*	(228)
179	*Murex septemangulatus*	*Murex septangularis*	(211)

It will be noticed that Winckworth has used the Montagu names, except in the case of his number 206, where he uses Donovan's name owing to the preoccupation of Montagu's *minimum.*

If one turns to Turton's *Conchological Dictionary*, on page xv it will be found that Turton records *seven* volumes instead of five. Did Donovan intend at one time to issue further volumes, and is this the explanation of Maton and Rackett's statement that "*five volumes have appeared . . . not yet completed*", referred to before ?

In 1806 the name of Sowerby comes before the conchologists for the first time, borne by James, who lived 1757–1822, and who in the year mentioned wrote the part of *The British Miscellany*, containing a species described by him *Tellina similis*, plate 75, page 20, from Brighton. This is evidently *Tellina fabula* Gmelin. On plate 48 the author gives a figure of *Octopus vulgaris* Lamarck, which Forbes and Hanley copy in their plate NNN.

(*To be concluded*)

INTERESTING HABITAT OF *P. JENKINSI*

By Professor G. D. HALE CARPENTER.

(*Read before the Society, 9th December*, 1944.)

ON 14th October last I found *Potamopyrgus jenkinsi* (Smith) at Pentire Head, Polzeath, North Cornwall, on the face of the very steep grassy slope just north of the actual cliff of the point of Pentire.

Among some rocks cropping out from the long grass was a minute pool of perfectly sweet water, due to seepage through the rocks. It was about four inches deep, three or four feet across, with clear water and fine mud at the bottom on which the *P. jenkinsi* was abundant. The only other life visible was *Gammarus*. A vertical slab of shale separated off a small patch of duckweed. This place was about one hundred feet above the water, but not far back, so that it would get a certain amount of salt, although at the time I found it the water was perfectly sweet.

The interesting point is how did *Potamopyrgus* get to this minute pool ? There were no ponds or streamlets that I could find on the headland, but at the base of the rock, about two-thirds of a mile in a straight line over the top, was a tiny trickling stream (in which I found other specimens) running down to the rocks on the beach. Presumably some bird drinking there had at some time picked up minute young of *Potamopyrgus* in mud on its feet and taken them to this other freshwater supply when it went there to drink.

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VOL. 22. 29th NOVEMBER, 1945. No. 7.

THE DISTRIBUTION OF *CREPIDULA FORNICATA* L.

By H. H. BLOOMER.

THE late G. C. Robson was interested in the spread of *Crepidula*, the American slipper limpet, in British coastal waters,[1] and discussed its prevalence in Poole Harbour and T. E. Belcher's report of its presence in Studland Bay.[2]

Robson asked me to look for its appearance in Swanage Bay, and its extension westwards. I understand he did not keep any notes of my communications to him, nor am I aware that he published anything further on the subject, so perhaps it will be as well to place on record the results of my search.

Studland Bay.—I see from my notebook that on the 7th July, 1931, I counted there eighteen *Crepidula* on a walk along the shore. On another visit, either in 1933 or 1934, a day following a gale and high sea, I saw a large number, many of them alive, hence I think there can be no doubt of its establishment in Studland Bay.

Swanage Bay.—I found a small shell in January, 1930, and afterwards, from time to time, more empty shells, but hesitated to accept their presence as conclusive evidence because of my uncertainty of the effect of local currents and tidal action near this section of the coast. However, in 1937 I picked up a live specimen and since have gathered more, altogether not many; but then until 1939 and so far as I was able to judge from the quantity washed ashore other shells were diminishing in number and those containing the live animal scarcer still. Several weeks ago, and after removal of coast defence works, I obtained another live *Crepidula.* I now think the evidence is sufficient to say that it is established in Swanage Bay, though probably to a lesser extent than in Studland Bay.

Westwards from Swanage Bay.—Durlston Bay, for reasons I need not enter upon, appears to be unsuitable, and the south Purbeck coast is rocky with steep cliffs; the bays are few and some distance apart, thus the sandy stretches are very restricted until Weymouth Bay is reached. Before 1939 I searched Chapman's Pool, Kimmeridge Bay, Worbarrow Bay, and Lulworth Cove, but there was no trace of *Crepidula.* Weymouth Bay I did not examine.

In 1940 military control caused further investigation to cease.

---

[1] *Proc. Malac. Soc. Lond.*, p. 274, 1929.
[2] *J. Conch.*, p. 146, 1924.

BRITISH MARINE RECORDS.

By A. P. GARDINER.

THE following records have been sent to me by Mr. W. Fowler, the first set from South-West Cornwall (Reg. viii). The four following were obtained from weed washings :—

1. *Skenea serpuloides* (Montagu).
2. *Omalogyra atomus* (Philippi).
3. *Circulus striatus* (Philippi).
4. *Ammonicera tricarinata* (Webster).

Of these (3) is of great interest, not only is it new for Region viii, but the only other occurrence is from North-West Ireland where it has been found dead. I found one recently in drift material from Bundoran.

The occurrence of (4) is still more remarkable, I had no previous record on its map.

Mr. Fowler has also procured *Galeomma turtoni*, Sowerby, in Region viii. This is the only recent record outside the Channel Islands and perhaps the only quite dependable record for the mainland of Great Britain.

This second set of records was sent to me in response to a request for older ones, as well as for those of Fowler's recent hunting in Pembroke (Regs. xi*a* and xi*b*).

Acanthochitona discrepans (Brown). Very large ones in oyster valves at Neyland, Milford Haven, 1945.

Philbertia asperrima (Brown). Two dredged in about 12 fathoms, Fermain Bay, Guernsey, 1932. One dead but fresh, Studland, 1927.

I obtained one living from a lobster pot at Chideock some years ago.

Cirsotrema commutatum (Monterosato). Several dead but fresh at Pendine, Reg. ix*a*.

I have found seven dead shells of this species at Helford, Cornwall, and think that there is considerable reason for including it in our list.

Fowler visited Lydstep, Cooke's habitat for *Nucella lapillus* (Linné) with reduced or absent opercula. He found them still there, and observed the same peculiar occurrence in *Littorina littorea* (Linné), both at Lydstep, Waterwynch, Tenby, and Freshwater. He thinks this absence or imperfection of the operculum may be caused by *Balanus* in the mouth of the shell. I have not observed this myself, many of my shells are quite clean.

Acanthochitona communis (Risso), 12 fathoms, Holyhead. This is important as it goes to confirm some old and rather vague records for this region.

Calliostoma zizyphinus conuloide Lamarck. Fowler reports that the colony of this at Milford has been wiped out by oil as a result of bombing. I have found this form at Helford.

Mytilus galloprovincialis Lamarck at Pendine, Pembroke. I have taken this species at the original habitat, St. Ives Bay, and in the Helford River. I must add that R. Winckworth identified *Ammonicera tricarinata* before I saw the shell, otherwise I should have feared to make a definite pronouncement because of its great rarity.

WORK AND WORKERS ON BRITISH MOLLUSCA.

By A. E. Salisbury.

(*Presidential Address.*)

(*Concluded from p.* 145.)

From Rostock was published *Beschreibung der Naturalien-Sammlung der Universität zu Rostock*, by Heinrich Friedrich Link, during the years 1806–8. From this the British List takes the generic name *Nuculana.* This work has been made available to students by a photostat reprint of the pages relative to Mollusca, under the supervision of Tomlin and Winckworth, who added an index to the genera, and later on an index to the species.[1]

In 1807 the joint authors, William George Maton and the Rev. Thomas Rackett, published *A Descriptive Catalogue of the British Testacea.*[2] Relative to this Catalogue, Turton in his *Dictionary* remarks: "A transcription of the words of Linné, with an attempt at a translation of the words of Montagu," and "It is probable that the whole art of typography cannot produce so gross a mass of errors", and two more whole pages of almost vitriolic abuse for which Turton at the end of his list of authors offers an apologia.

Maton was a doctor and at the time Vice-President of the Linnean Society; he lived from 1774 to 1835.

Rackett, the elder of the two authors, was born in 1757, and survived Maton by six years.

Both took a hand in editing Pulteney's works, for Maton produced an edition in 1805 of Pulteney's *General View of the Writings of Linnæus*, while Rackett edited the second edition of Pulteney's *Dorset Catalogue.*

During these years of upheaval in Europe there is not much to record after Montfort, who in 1808 published from Paris his *Conchyliologie Systématique*, Tom. i, and after some delay, in 1810, Tom. 2, which is the first book definitely to select generic types and therefore demands the notice of all systematists. Montfort altered the terminal syllable of certain names of genera already in use; for instance we get *Emarginulus* for Lamarck's *Emarginula*, *Patellus* for *Patella*, but he gives as the type of this genus *Patellus roseus* Roissy, which is a *Fissurella*, as the figure shows; Montfort drew the figures and engraved them himself. These points rather invite questions as to what his types stand for in certain cases. A peculiar omission is evident in the "Table polyglotte et synonymique des genres et des espèces de coquilles contenues dans ce volume", that is at the end of vol. 2, where no name beginning with the letter T is included. As they are not numerous I give them here:—

TECTUS		page 187
TELESCOPIUM		439
TEREBELLUM	(Vermes)	11
,,	(Mollusca)	370
,,	= *SERAPHS*	375
TEREBRUM		431

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[1] Tomlin and Winckworth, *Proc. Malac. Soc.*, vol. xxii, pt. i, March, 1936.

[2] Maton and Rackett, *Trans. Linn. Soc.*, vol. 8, 1807, art. ii, pp. 17–250, pls. 1–3, 3*a*; add. et corr., pp. 386, 387.

	TESTACELLA	page 95
	THEODOXUS	351
	TOMOGERES	359
	TRITON	587
	TROCHUS	179
	TROPHON	483
	TURBINELLUS	547
	TURBO	203
	TURRIS	539
TURITELLUS	*TURRITELLUS*	211
	TYPHIS	615

A third volume was contemplated, and on the fly-leaf to vol. 2 it is stated that this is under press. Apparently it was never published.

That Montfort considered that he was quite in order in altering the generic names, and that he did intend his name to represent the same genus, is proved by his remark on page 255 of vol. 2, where he says, under *Phasianus*, " Nous donnons pour type de ce genre, *formé par M. de Lamarck*. . . .

John Fleming,[1] a Scotch divine who lived 1785–1857, wrote the articles on Conchology in the early editions of the Supplement to *Encyclopædia Britannica*. He did not sign these articles ; the first appears to be that in the Edinburgh Encyclopædia [2] from which date *Odostomia* and *Cæcum*. In the 1818 *Encyclopædia Britannica* article *Segmentina* and *Cingula* were proposed. As has been shown by Kennard and Woodward and also by Winckworth he was one of the early writers who selected types for his genera.

William Elford Leach (1790 to 1836), one of whose first essays in Zoology was the editing of George Low's " Fauna Orcadensis " from his manuscript, in early days wrote the article on Conchology in the *Encyclopædia Britannica*, to which in later editions Fleming contributed. Leach's greatest interest appears to have been in Entomology.

The manuscript of his " Molluscorum Britanniæ Synopsis " was used, and the latter part edited, by J. E. Gray in 1852. Gray says in his preface that the first 116 pages were actually printed and the plates engraved in 1820, and had been revised while in proof form, I presume, by Dr. Leach himself. The year before Leach distributed these sheets he contributed Appendix II to Ross's *Voyage of Discovery to the North Pole*, and again vol. 2, Appendix No. 4.

To two of his great friends, Savigny and Cuvier, he dedicated parts of his " Synopsis ", with a third part to Poli, of whom he was a great admirer. He was abroad a great deal, and it was at Genoa after a few days' illness of cholera that he died in April, 1837.

In the teens of last century Thomas Brown entered the world of Natural History, about whom as I write comes to hand a history from the pen of Dr. J. Wilfrid Jackson [3] to which little can be added. At one time he owned a mill, but it was destroyed by fire and unfortunately Brown had failed to insure it ; this misfortune left him solely dependent

[1] Winckworth, *Proc. Malac. Soc.*, xviii, p. 224.

[2] Kennard and Woodward, *Proc. Malac. Soc.*, xv, p. 47.

[3] *Mem. Proc. Manchester Lit. Phil. Soc.*, vol. 86, September, 1944, 28 pp., with appendix.

on his natural history writings, and it was probably due to this, too, that he got into arrears with his subscription to the Linnean Society to the extent of being twenty-three years behind!

In 1815 Samuel Brookes wrote "An Introduction to the Study of Conchology including observations on the Linnæan Genera and on the arrangement of M. Lamarck, a Glossary and A Table of English Names, illustrated with Coloured plates". The British Museum Catalogue states coloured plates as does the title, but my own copy has nine coloured and two plain. I have a MS. note that the plates were drawn and coloured by the author himself. The publishers were John and Arthur Arch, of 61 Cornhill. The author in his preface is writing from Penhein, 10th May, 1815.

Brookes notices the difference of "animals" of various shells, for he remarks of Tellina, "Linnæus calls it a TETHYS; so also he does the OYSTER, from which it differs much."

The printers of the work are Richard and Arthur Taylor, of Shoe Lane. In my own copy the plates are unsigned though numbered, saving Plate 10 which is signed by the engraver "H. Weddell, Sc." The coloured plates are of the shells only and the two plain plates are of the complete animals.

In the same year Edward John Burrow (1785–1861), a clergyman, wrote an *Elemants of Conchology* . . ., published in London, with new editions in 1818, 1825, and 1844, all editions having 23 plates. The plates in my original 1825 edition are plain, but some at least of the later editions had coloured plates.

William Wood (1774–1857), having in 1807 produced a Zoography of three volumes and edited a Natural History of twenty volumes by Buffon in 1812, turned his attention to things conchological, and in 1814[1] published his *General Conchology* of upwards of 200 pages in all and 60 plates in colour; this was issued again in 1835 with new title page; otherwise it is a reprint of the first edition. At the time of the first issue it was evident that Wood purposed a second volume because the title page states that it is vol. 1, and on the last page are the words "end of the first volume"; it would also be well to mention that there is a plate numbered 4*, so that the numbering of plates only takes us to 50. The title page also says that the shells are "illustrated with plates, drawn and coloured from nature by W. Wood". Wood started off in his "advertisement" with the intent to describe every species of shell, and to "figure all the most prominent".

In 1818 he published in London the *Index Testaceologicus*, of which editions or additions were issued in 1824, 1828, 1829, the supplement appearing in 1828. "A new edition" was published by S. Hanley with entirely new text, and a further Appendix by him appeared in 1842–1856, the plate numbering being in sequence to the Index.

Wood produced an *Index Entomologicus* similar to that of Shells.

Charles Wodarch, in 1820, wrote for sale at the emporium of John Mawe *An Introduction to the Study of Conchology describing the Orders,*

---

[1] *Vide* Iredale, *Proc. Malac. Soc.*, xv, 1922, p. 91.

genera and species of Shells . . . and directions for collecting, preserving, and cleaning shells. This original edition is by no means common ; it was published by Longman and by J. Mawe, and consists of xxiv + 119 pp., and index, with four plates and their explanations illustrating sixty-three species. Mawe edited a new edition in 1822, rearranging and adding to the original; it has xv, 152 pp. and three extra plates. These plates, one of which is the frontispiece, have " J. Mawe, 149 Strand " at the foot of each with " E. A. Crouch lithog " and " printed by Rowney & Foster," whereas those of the original are blank. In 1837 " a new edition " was published by Mawe " with considerable additions and alterations ", xiii, 140 pp. : the number of plates is the same but the illustrations on the frontispiece are different, this frontispiece bearing the names " E. A. Crouch Lith.", " Printed by W. Day ", and at the foot " I. Mawe, 149 Strand ", the other plates " J. Mawe, 149 Strand " as before. Further editions were published also in 1824, 1825, 1831, 1839, and perhaps still more. It would appear that Mawe altered the frontispiece in perhaps each edition, and one would be interested to see some of these issues. For instance the 1822 and 1837 editions have illustrations on the frontispiece as follow :—

1822 Edition.

1	Buccinum dimidiatum . . .	Fawn Needle
2	Buccinum subulatum . . .	Tiger Spire
3	Strombus fusus	Spindle
4	Murex Colus Nicobaricus . . .	Embroidered Red Crane
5	Murex colus	Crane
6	Turbo imbricatus	Rusty Screw
?	Turbo Exoletus or Cinctus . .	Ribbed Screw

1827 Edition.

1	Voluta lyrica	The Lyre
2 & 3	Voluta Zebra (two varieties) . .	Zebra Volute
4	Conus Zebra	Zebra Cone
5	Conus Coccineus	Flamingo Cone

Advertisements state that copies of the work can be had with either plain or coloured plates.

Mawe died in 1829 and his business in the Strand was taken over by one J. Tennant some years before Mawe's death, who seems to have published a fourth edition of Wodarch.[1]

In 1822–3 John George Children published articles on " Lamarck's Genera of Shells ", at first anonymously in the *Quarterly Journal of Science, Literature and Arts*,[2] and then in the following year, 1823, separately, under his name, wherein he definitely selected types for the genera ; these selected types were not always the same as the " examples " mentioned by Lamarck himself. A paper was published some fourteen years ago in *Smithsonian Miscellaneous Collections*, listing the types of Lamarck's genera selected by Children.[3]

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[1] *Vide* Iredale, *Proc. Malac. Soc.*, xv, pp. 83, 84, 1922.

[2] Vol. xiv, 1822 ; xv, xvi, 1823.

[3] Kennard, Salisbury, and Woodward, *Smithson. Misc. Coll.*, vol. 22, No. 17. Washington, 1931.

Children also wrote on Ornithology, Lepidoptera, and Mineralogy. He was born in 1777 and died in 1852.

From Paris about this time was published Risso's *Histoire Naturelle des principales productions de l'Europe Méridionale* which had, as might be expected, a bearing on the British Mollusca; some of the genera mentioned therein are in use in the lists of our fauna to-day.

Charles Dubois wrote in 1825 an Epitome of Lamarck's arrangement of Testacea . . . an octavo publication which claims to be "a free Translation of his (Lamarck's) work *Animaux sans vertèbres* with illustrative observations and comparative and synoptic tables of the system of Linnæus and Lamarck", a new edition being published in 1828.

An example of "Guides" is a book lent me by Dr. Hopwood, *The Natural History of the district of Teignmouth, Dawlish, and Torquay: or Lists of the different species of Animals, Vegetables, and Minerals* . . ., which forms part 2 of Carrington's *The Teignmouth, Dawlish, and Torquay Guide*, published in 1829–1830, this part by W. Turton and J. F. Kingston appearing in the last mentioned year. The book is unpaged, but a count reveals the number as 234, 46 being devoted to Conchology.

In the middle twenties the *Zoological Journal* appeared, conducted by Thomas Bell, J. G. Children, James de Carle Sowerby, and G. B. Sowerby, and thus we get an early mention of the Sowerby family. The contributors to the first number, which is dated March, 1824, were J. O. French, W. E. Leach, J. E. Gray, G. A. Desmarest, H. T. de la Beche, M. B. Gaspard, A. Odier, besides the editors already mentioned. As Leach was contributing at this date it is rather to be wondered at that his "Synopsis" was not published.

James de Carle Sowerby lived 1787–1871, and his earliest contribution to Conchology seems to have been some of the plates for *Genera of Recent and Fossil Shells*, by James Sowerby and G. B. Sowerby.[1] A copy of this in the British Museum has plates unnumbered.

James de Carle Sowerby continued the work which James Sowerby had begun in 1812 on the Mineral Conchology of Great Britain.

James Sowerby (1757–1822), beyond the "Genera" and "Mineral Conchology", was chiefly interested in Botany and Mineralogy.

The G. B. Sowerby of the early *Zoological Journal* is the first of that name; he was born 1788 and died 1854: he continued the *Genera of Recent and Fossil Shells* started by James.

The writings of the Sowerbys I, II, and III are too voluminous to dwell upon here at any length, but it may be convenient to mention some at least of the most important works in which they were concerned. I have numbered them from A alphabetically as they appeared chronologically so that they may conveniently be referred to in the following table which has been drawn up largely with the assistance of the Catalogue of the Library of the British Museum (Natural History).

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[1] *Vide* Sherborn, *Ann. Mag. Nat. Hist.* (6), xiii, 1894, p. 370, and Sykes, *Pocr. Malac. Soc.*, vii, 1908, p. 194.

A. *Genera of Recent and Fossil Shells* (commenced by J. Sowerby), 1820–1834.
B. *A Catalogue of the Shells contained in the collection of the . . . Earl of Tankerville*, 1825.
C. *Zoological Journal*, 1825–6.
D. *Species Conchyliorum* (*Ancillaria, Ovulum, Pandora*), 1830.
E. *Conchological Illustrations*, 1832–1841.
F. *Malacological and Conchological Magazine*, 1838–9.
G. *Thesaurus Conchyliorum*, 1843–1887.
H. *A Conchological Manual*, 1839.
I. *Illustrated Index of British Shells*, 1859 and 1887.
J. *Conchologia Iconica*, volumes 15 (part)–20, 1865–1878.
K. *Conchological Illustrations* (Sowerby & Gray), 1832.
L. *Marine Shells of South Africa*, 1892. App. 1897.

G. B. S. (*I*).	*G. B. S.* (*II*).	*G. B. S.* (*III*).
A	—	—
B	—	—
C	—	—
D	—	—
E	—	—
F	—	—
G	G	G
—	H	—
—	I 1st ed.	I 2nd ed.
—	J	—
—	K with Gray [1]	—
—	—	L

So that it is only as regards the *Thesaurus Conchyliorum* that the succession through the three generations was kept up. But it is with G. B. S. of the third name [2] that some of us were personally acquainted.

Adverting for a moment to G. B. Sowerby (I) an entry in the *British Museum Catalogue* reminds one of the note on the subject of the entry, by Tomlin [3]; Stutchbury's *Catalogue*, to wit, which renders information a little more complete.

Lovell Augustus Reeve,[4] born in 1814, produced *Conchologia Systematica* in two volumes with coloured illustrations, published during 1841 and 1842 by Longman Brown and Longmans, of London, in quarto form, and bound up by a then new method with which binders were toying, which consisted briefly of painting the back edge of the pages with a formula containing rubber as its main constituent; in course of time this solution hardened so much as to become brittle, and as a result the pages broke away from their anchorage and fell out. Some of the early volumes of the *Conchologia Iconica* were first bound thus, but the method did not have a long life in more senses than one! and it was discarded. This method was used by Stanford many years later with similar results!

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[1] *Vide* Sherborn, *Proc. Malac. Soc.*, viii 1909, p. 331.
[2] *Vide* B. B. Woodward, *Proc. Malac. Soc.*, xv, December, 1922, p. 65.
[3] Tomlin, *Proc. Malac. Soc.*, xxii, November, 1937, p. 350.
[4] For life, *vide* Melvill, *Journ. Conch.*, vol. ix, 1900, pp. 344–357.

Reeve writing to Dr. Gray[1] at a later date says of this work that it was "costly and the only chance left to me of pursuing the subject was to turn printer and publisher myself", and thus comes into existence the firm of Reeve Brothers, of King William Street, Strand, afterwards Reeve and Company, Henrietta Street, Covent Garden, and later still of Ashford, Kent.

The following particulars of the "Reeve" firm may be of use:—

In 1843 Lovell Reeve started the business by himself in King William Street, Strand.

In 1843 the firm's name became Reeve Brothers.

In 1847 the name is Reeve Benham and Reeve.

In 1851 removed to Henrietta Street, Covent Garden, but Reeve's brother has for some reason dropped out and the name is Reeve and Benham, while towards the end of the year Benham has left Reeve by himself and alone he remains until we have Lovell Reeve and Company in 1862.

The formation of the firm was to make possible the publication of the *Conchologia Iconica*, which we all know as Reeve's most important work, consisting of 15½ volumes by Lovell Reeve; the remainder was compiled and written by G. B. Sowerby (II) at Mrs. Reeve's request after her husband's death at the early age of 51. The *Iconica* was commenced the year after the *Systematica's* second volume was published, namely 1843, and the last volume was published in 1878, thirteen years after Reeve's death.

Three years after Reeve started the publication of the *Iconica* he commenced *Initiamenta Conchologica*, for which see Reynell in *Proc. Malac. Soc.*, xii, 44.

The next of Reeve's books published by his firm was the *Land and Freshwater Mollusks indigenous to, or naturalized in the British Isles*. This delightful little book is illustrated by little woodcuts of the animals and shells throughout the text. The shells are from the pencil of G. B. Sowerby (II ?), and the figures of the living animal of a species of each genus at the head thereof, by O. Jewitt.

In 1848 Reeve and Arthur Adams wrote up the mollusca of the "Samarang" in a folio publication, and in collaboration with Agnes Catlow he produced the *Conchologist's Nomenclator* in 1845.

The Mollusca of the "Samarang" appeared in parts 3 and 4 of the *Zoology of the Voyage* and to which Professor Richard Owen contributed the Anatomy of *Spirula*. I have *parts* of a copy of Part 3 which contained this article by Owen and once belonged to him and which he presumably cut up to extract some of the remarks on the Cephalopoda. The cover bears the autograph of Professor Owen. This was published in London by Reeve's firm, then known as Reeve, Benham and Reeve at their first address in King William Street. Benham entered the firm as a partner, probably in 1846 or early in 1847.[2] Reynell states that parts i–x of the *Elements* were published by Reeve Bros., but my part viii is stated on the cover to have been printed and published by Reeve, Benham and Reeve, so Benham must have joined the firm by the time this part appeared: furthermore part vi is the last number on the cover of which Fortin, Masson et Cie, Paris, are said to be publishers with Reeve Bros., so that it would appear as though there was some objection raised by Benham, or against him, relative to the French firm; this is a little point, but Reynell had evidently overlooked the change of name in the firm when he wrote his note on this book.[1]

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[1] *Vide* Dedication letter to Dr. Gray in Reeve's *Land and Freshwater Mollusks . . . British Isles*, 1863.

[2] See title page vol. iv, *Conch. Icon.*

Reynell says that the 1860 given as the date of the first volume of the *Elements* " is far from correct ", but I must differ; this date applies correctly to the first volume of the *Elements*, and Reeve dated his preface 1859 for this edition. The earlier dates refer to the edition issued in parts as the *Initiamenta Conchologica or Elements* . . . ; true the contents are the same with the exception of the new preface and altered title, but I look upon the two as separate editions, for this reason alone if for nothing else.

Relative to the *Conchologist's Nomenclator*, by (as the title has it) " Agnes Catlow . . . *assisted* by Lovell Reeve " . . . this is stated to have been published by Reeve Bros. so that Benham had not become a partner of the Reeve firm by 1845, the date of publication. In their preface the authors say that this is the first attempt . . . towards the compilation of a conchological catalogue of species. I have before me an interleaved copy which was the property of Lombe Taylor, who has added many names.

Returning for a moment to the parts of the *Initiamenta or Elements*, the determination of the date of entry into the firm makes it clear that parts ii to vii which are as Reynell says undated were all published before the end of 1847 at least, and probably by the end of 1846.

The publication of the greatest of Reeve's productions, the *Conchologia Iconica*, coincided with the establishment of his firm. It is well known as the standard picture book, one might call it, for all conchologists, but it may be well to call attention to the fact that some copies exist without the extra plates of " Conus " or that of " Murex ".

Lovell Reeve died in 1865, but he had prepared the contents of vol. xv up to but not including *Pyramidella* which started the genera by Sowerby.

As is very well known and as Reeve stated, this repertory of mollusca was intended to include all the known species, and is mainly an illustrated epitome of the Cuming Collection. His portrait is included as a frontispiece to vol. v of the *Iconica* signed by him and dated 1840. Cuming's name is the first mentioned of those to whom Reeve dedicated his work, the others being Captain Belcher, Richard Hinds, Quoy and Gaimard, and Alcide D'Orbigny, to whom we are, says Reeve, " especially indebted for their accurate notation of localities." As to how this was done in the case of some of Cuming's localities there are varying opinions, but E. A. Smith in his history of the Collections of the British Museum remarks that it is not so much to be wondered at that there are mistakes but that there are so few! As we know Cuming was occupied on the collection of exotic shells and did not interest himself so much in those of Britain, but in that he was an English worker he deserves our attention here. As Melvill[1] states, Cuming was a Devon man born in 1791. A further portrait of Cuming is given as frontispiece of vol. viii of the *Journal of Conchology* taken at a later date than that in vol. v of the *Conchologia Iconica.* At the very earliest opportunity he turned to collecting, which occurred when he went to take up a job in Valparaiso where he met Frembley, and he must have been very thrifty if as Melvill says his parents were possessed of small means because as the same epitome of Cuming's life records he had a yacht specially designed for dredging and retired from business to devote his whole time to the study and collecting of Botanical and Zoological specimens; yes, he was interested in botany too, which is not always remembered by some of our own inclination, indeed it was due to the combination of these two interests that he discovered so many molluscan forms associated with the flora of the lands he visited. From South America Cuming returned to England after visiting many of the out-of-the-way islands and was persuaded to visit the eastern seas and Philippine Islands, and it is recorded that letters received from him dated from Manilla [*sic*] in 1836 reported his arrival at that port and that he hoped to make some excursions about the end of September after the rainy season had subsided. The record goes on to say that " he then left Manilla for the Hacienda of Calaguan in the centre of Luyon [*sic*], where he remained until the 15th day of December, visiting and exploring the woods and mountains in the neighbourhood, and then returned to Manilla with his collections. These consisted of about 1,150 species found on the island of Luyon " : these species belong to his botanical collections, of the Molluscan finds without having visited the coast he had collected no less than 250 kinds of shells, and a proportionate number of insects, reptiles, crustacea, etc. Cuming was extremely lucky in his reception by the officials, Government and otherwise, in all the countries that he visited: in the Philippines (belonging then to Spain) which hitherto had been so jealous of foreigners visiting their country no naturalist who had ever penetrated into the interior of the island received anything like a welcome which was the fortune of Cuming. Cuming must have been a man of exceptional physique and stamina for it is also recorded that " Although Calaguan is deemed the most unhealthy spot in the island (Luyon), and although Mr. Cuming explored the woods, mountains, marshes, and river-banks, frequently exposed to torrents of rain during a whole day, he never suffered an hour from illness, nor experienced a moment's pain, except from the bites of venomous insects ". A further letter to Mr. Bell, dated 1st November, 1837, said that after having been absent ten months among the southern islands of the Philippines, he had made a very large collection of Crustacea, which he had forwarded to the Zoological Society and to Mr. Bell; also five cases of animals for Mr. Owen, including a great number of fish, snakes, lizards, frogs, dragons, and bats. He states in this letter that he also collected 1,809 species of shells, amongst which are 300 from the woods, many of them magnificent. It was his intention to leave Manilla in a month for the southern provinces of Luzon and the adjacent islands, for a period of at least nine months.

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[1] Reynell, *Proc. Malac. Soc.*, xii, p. 46.

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[1] *Vide* Melvill, *Journ. Conch.*, viii, 1895, p. 59.

Cuming offered his collection to the British Museum as early as 1848, but it was not purchased until 1866! It is thanks only to Cuming, I suppose, that it did not go the way of certain other and smaller collections which the authorities argued over until too late! Such then was the energy and I think we can say luck of the man who laid the foundation, and which is indeed a great part of our national collection of shells.

These Cumingian travels and the abundant results thereof gave grand opportunities to collectors of the day and to men such as Sowerby, Deshayes, Broderip, Pfeiffer, Henry and Arthur Adams, and the rest for describing the new forms which Cuming had brought or sent home, and the early volumes of the *Proceedings of the Zoological Society* bear witness to their labours in this direction, and I have no doubt fired G. B. Sowerby (I) with the idea of his Thesaurus.

In 1822 the *Times Telescope* for that year has an article of 50 pages entitled "Outlines of Conchology", which deals with the subject in more or less popular fashion suitable, shall we say, to the times and progress of the science. The frontispiece of the volume is relative to this article and illustrates "*Buccinum harpa*", "*Buccinum striatum*", "*Cypræa talpa*", *Cypræa litterata*", and "*Argonauta argo*". It records that "about the end of the sixteenth century many individuals began to form collections of testaceous bodies. The first museum of this kind of any consequence was begun by Benedict Ceruto and afterwards augmented by Calceolari. An account of the specimens contained in it was published by Olivi, in 1585, and in 1622, Ciocco published plates of the shells". It goes on to mention some of the early works published "to teach collectors the names of the different specimens in their museums". The article is not signed, but a somewhat suggestive paragraph occurs as follows: "As various impositions are practiced by dealers in shells, the young collector should first possess himself of some well defined species of each genus. . . . These may be obtained on reasonable terms of Mr. Mawe, 149 Strand. . . ." A list of authors is given at the end mentioning most of the names of those we have been here discussing. The *Times Telescope* first appeared in 1813 and one such article on some branch of Natural History was included in each issue.

Among the works devoted to British Mollusca which appeared after Donovan, Montagu, and Pennant was that of William Turton, who started his conchological writings with a translation from Gmelin's edition of the *Systema Naturæ* "Amended and enlarged", 1802. *A Conchological Dictionary of the British Islands*, of which casual mention has already been made, was published by Booth, London, in 1819. The *British Museum Catalogue* only mentions an edition with coloured plates, but I have a copy with plain plates as well: these plates were drawn by his daughter, who had the whimsical idea of portraying her father's silhouette in negative, the black being the form of an urn, on the title page of the book; mention, too, has been made of the list of authors and Turton's remarks upon them.

A Manual of the Land and Freshwater Shells of the British Islands . . . with coloured plates of every species was published in London in October, 1831, by Longman Rees, Orme, Brown, and Green. This is always a favourite little book of mine, perhaps because it was almost the first of the older works which I was able to obtain, although I believe it is rare, and indeed I was fortunate enough to come across a second copy, and to fill a want in the library of that friend to all of us, I refer to Mr. J. R. le B. Tomlin, and this alone I think indicates its infrequency on the shelves of the bookshops even in the past three-quarters of a century! The body of the book is prefaced by a letter to William Clark, of Bath, in which he insists on the careful examination of the animal before the specific distinction can be determinately fixed. So we see the erroneous idea of Linnæus and his followers of segregating the shell from the soft part dying away, and that of the shell and animal so called forming parts of one and the same animal more and more advocated. In all fairness to the great Linnæus one should say that it is well known and a recorded fact that he was less interested in the molluscous animals than in any other order of either Botany or Zoology.

In 1822 Turton had printed in Exeter for Rodwell and Martin, of Bond Street, London (the *British Museum Catalogue* has it as published in Exeter, but that would appear to be incorrect), *Conchylia Insularum Britannicarum, The shells of the British Islands systematically arranged*, and which he dedicated to Leopold Duke of Saxony. This venture got no further, however, than the one volume of the bivalves, a large paper reprint of which was published in 1848 by Reeve, Benham and Reeve. The original is a quarto book and contained a concordance of the synonymy of the "science for about 50 years"; the references in the body of the text to other works is very full. The reprint by the way had its subtitle altered to read: . . . "The Bivalve shells of the British Islands," and is stated on the title page to be "Reprinted verbatim from the original edition"; this is not strictly true, however, as the editor has left out the errata which occur on the back of the last page in the original, and has made corrections in the text, but not all, leaving out the most important in fact. The errors in corrections by Reeve are as follow:—

Page 69, the original calls for correction, line 13, for *equilateral* read *inequilateral* (not corrected in reprint).

Page 117, last line but one, for *inequivalve* read *inequilateral* (not corrected in reprint).

Page 119, line 2, for *is* read *in* (corrected wrongly to *as*).

Page 168, line 9, for *proceed* read *proceeds* (not corrected in reprint).

The coloured plates are good and accurate even if they are somewhat unusually coloured specimens. The first plate in the work under review states, "I Curtis omnes pinx: et sculp."

In 1800 John Edward Gray was born in Walsall and in his early days was inclined to view the shell and soft parts as two separate identities; in fact Jeffreys says in his introduction to *British Conchology* that he disturbed scientists of other views, but in an early paper Gray wrote "An arrangement of Mollusca according to their internal structure," so that it seems that by this date, 1821, he had reformed his views. Gray's writings were voluminous; he is said to have been the author of upwards of a thousand papers on various branches of Natural History, but the works relative particularly to the British molluscan fauna are confined to his edition of Turton's *Manual* and to Leach's *Molluscorum Britanniæ Synopsis*, which Gray edited from Leach's own manuscript; as Gray remarks, the work was to a certain extent in the press in 1820 when through ill health the author was prevented from completing it. Plates in my copy up to v* are signed "I Curtis sculp." V* is blank except for the publisher's name which, by the way, is not the same as the firm publishing the book; plates vi to x, xii, and xiii have signatures "I Curtis delt." and "Me. Joyeau sculp", plate xi has no signatures, not even the publisher's name, that of the plates being "Baldwin, Cradock & Jay July 1820", so that we see these were at least ready for the issue of the book by Leach himself at that date; as regards plate x it is possible that this may have been added by Gray to this edition which was published in 1852.

In the "new edition with additions" of Gray's *Turton's Manual of the Land and Fresh Water Shells of the British Islands*, the editor in his preface calls attention to his views as regards shells published in the first volume of the *Zoological Journal* and in the *Philosophical Transactions* for 1833; this latter paper is reprinted in Dr. G. Johnston's *Introduction to Conchology*. Little vignettes are given to each genus similar to those of Reeve's book on British Molluscs. Gray refers to the operculum as being part of the animal as apart from the shell. The plates of this edition which Gray dedicates to his wife have the publisher's name removed and the names of the species inserted at foot of each plate, otherwise they are exactly the same as in the 1840 edition.

In the 1840 edition of *Turton's Manual of the Land and Fresh Water Shells of the British Islands* Gray calls attention to the alterations which he has made from the original Turton's edition and in particular to the sketch on geographical distribution which he says is dealt with for the first time and would encourage workers to give heed to this aspect. Gray also introduces the fossil species to his readers; he deals with the habitat, additions, and gives a bibliography of British Land and Freshwater Mollusca. His preface is dated 12th February, 1840, from Eliot Vale, Blackheath, and he dedicates the book to Mrs. Arthur Hill, of Bruce Castle, Tottenham. The plates are unsigned, but bear the name of the publisher, Longman and Co., January, 1840.

Gray entered the British Museum as an assistant to the Natural History Department in 1824, and became Keeper in 1840, the year in which he brought out his edition of Turton. At the age of 26 he married the widow of his cousin, Dr. E. W. Gray, who was her second husband's senior by thirteen years; however, she survived him by a year, Gray having died in 1875. Maria Emma Gray was responsible for the illustrations of *Figures of Molluscous Animals*, 1842–1857, but Gray himself did the systematic arrangement and wrote the preface together with the list of genera, which was reprinted from the *Proceedings of the Zoological Society* of 1847.

Gray was one of the editors of the *Annals and Magazine of Natural History* during the last seventeen years of his life.

Agnes Catlow, who wrote with Reeve the *Nomenclator* in 1845, was born about the year 1807 and died in 1889. She wrote *Popular Conchology or the Shell Cabinet arranged* in 1843, which was published in London by Longman; this firm seems to have adopted the *Cornucopia* as a decoration for the covers of some of their books of this period, as this appears on the front cover of this work and also on the cover of Gray's 1840 *Turton.* A second edition of the *Popular Conchology* appeared in 1854, of seventy more pages than the first edition.

During 1844 Charles Thorpe, assisted by several distinguished conchologists, as the title page says, and illustrated by Sowerby and Wood, published his *British Marine Conchology*. There is, however, only one plate which does not bear Sowerby's name: this plate is blank, so one can only suppose that it is Wood's contribution. Certain new species are described by Hanley, and a supplement of new species was contributed by William Bean.

William Macgillivray, who was Professor of Natural History at Aberdeen University, published in 1843 *A History of the Molluscous Animals of Scotland as found in the North-Eastern District* . . ., which went through a second edition in the following year under a slightly different title published in London: the first was published both in Aberdeen and London. It is as well to call attention to the fact that books were often printed in a different town to where they were published; this has been overlooked at times and has given rise to error. Macgillivray edited the sixth edition of Brown's *Conchologist's Textbook*. He was born in 1796 and died in 1852. In 1855 a posthumous work, *The Natural History of Dee Side and Braemar*, was issued from London and edited by E. Lankester, the list of Mollusca being contributed by Edward Forbes, but it appears that this was "privately printed".

William Swainson, born in 1789 and died 1855, was responsible for the two series of *Zoological Illustrations*, 1820–1833: he published his *Exotic Conchology* in 1821 or 1822, which was reissued in 1834–5. In 1841 Hanley edited a second edition with appendix and included the shells which were new in the Bligh Collection, a Catalogue of which Swainson had made in 1822. In 1835 he wrote his *Elements of Modern Conchology*, and lastly in 1840 a *Treatise on Malacology* was published in London—about the first time the term was used speaking of the Mollusca generally, indeed its subtitle is *Shells and Shell-Fish*, indicating that the author understood that his main title included both shell and soft parts.

The title page of the book has upon it a delicate little engraving drawn by Swainson himself and carried out by E. Finden. The text illustrations are well done. Chapter i is interesting reading indicative of the views of different writers.

During this decade and, indeed, extending into the next two, appeared the work of the brothers Henry and Arthur Adams; Henry lived between the years 1813–1877, whilst Arthur, seven years Henry's junior, lived from 1820 to 1878.

Arthur was the more prolific writer of the two: besides collaborating with Henry in *The Genera of Recent Mollusca*, he supplied the following monographs to the Sowerbys' *Thesaurus Conchyliorum: Eulima, Niso, Leiostraca, Obeliscus, Pyramidella, Monoptygma, Cyclostrema, Adeorbis*, and *Teinostoma*, during the years 1850 to 1864, besides collaborating with Sowerby in others. Arthur also edited the *Zoology of the Voyage of the "Samarang"*. The part dealing with the Mollusca came out in 1848. In his later years he wrote *Travels of a Naturalist in Japan and Manchuria*, published in London in 1870. He also contributed to *A Manual of Natural History for the Use of Travellers*, published in 1854.

Henry Adams died of paralysis, which had increased during the last year of his life very rapidly; he had been troubled with symptoms of spinal meningitis for some while before, which developed seriously and at last ended his life. He was an architect to the Customs Department of the Inland Revenue Office. Henry's collection, which included a number of types, went to the British Museum, and the remainder was bought by a London dealer, R. Geale, of 55 Great Russell Street: Sowerby was at No. 45 at the time.

Arthur Adams was a surgeon in the Royal Navy and was for a considerable time in the East, where he accumulated much molluscan material and a great number of species was described by him.

The first complete work on the British Mollusca was that of Forbes and Hanley, commenced in 1848 and completed five years later: this and Jeffreys' *British Conchology* still remain the standard works of reference. The *History of British Mollusca and their Shells* is, I suppose, the most ambitious work that has been undertaken relative to the subject, and in their preface the authors say that it was the urging of friends and the want of such a treatise that stimulated them to their task.

Forbes was 33 and Hanley 29 when they commenced their task, which occupied them for just over five years, 1848–1853. Among the cabinets placed at their disposal was that of Jeffreys.

The work of Forbes and Hanley is continually a source of inquiry, and even at this late date a little book has just been issued in which their illustrations are copied.

Forbes began his conchological writings with an account of the Mollusca of the Isle of Man in 1838, and following this were the Report on Mollusca and Radiata of the Aegean Sea, 1844, Fossil Shells from South America, 1846, Shells collected during the Niger Expedition, 1848, and later to Macgillivray's *Natural History of Dee Side* he contributed the Mollusca section. In 1855, *The Natural History of the European Seas*, continued by Godwin-Austen 1859, these two last being published after Forbes' death on 18th November, 1854, just a year after the completion of *The History of the British Mollusca.*

Forbes' mother wished him to be a physician, and he studied at Edinburgh towards this end, but his leaning was entirely towards Natural History, and her death in 1836 caused him to reconsider his calling, with the result that he relinquished his medical studies and made his first trip to study the natural history of the seas, from the Isle of Man, his birthplace, to Norway in a brig. He also studied Botany and made large collections from the countries which he visited. He was associated with several expeditions, and accompanied Lieut. Spratt to Lycia. Owing to illness contracted while away and to the inability of his father to send him further remittances he at last returned home and later accepted the Professorship of Botany at King's College, London, and became Curator of the Museum of the Geological Society, finally succeeding Professor Jameson at Edinburgh University in 1854; he died, as we have mentioned, in the same year.

Sylvanus Charles Thorp Hanley, his collaborator in the *British Mollusca*, in 1840 produced *The Young Conchologist's Book of Species* which was reissued under the title of *The Conchologist's Book of Species* in 1842. He edited as a second edition Swainson's *Exotic Conchology*, and in 1842–1856 published *An Illustrated and Descriptive Catalogue of Recent Bivalve Shells*, with 960 figures by Sowerby (II) and Wood, forming an appendix to the latter's *Index Testaceologicus*, of which he edited a new edition in 1856.

Hanley also contributed the monographs on *Tellina*, *Solarium*, and the Nuculidæ for the *Thesaurus Conchyliorum*, 1846–1863 *The Ipsa Linnæi Conchylia*, published in London, 1855, was one of his most important works, and his last was that undertaken with W. Theobald entitled *Conchologia Indica*, to which Lieut.-Col. Godwin Austen contributed the supplement in his *Land and Freshwater Mollusca of India.*[1] Hanley was born at Oxford, 7th January, 1819, and studied law at Wadham College, afterwards entering the Middle Temple, but, benefiting by his father's will, he devoted the rest of his life to conchological studies. He was elected to Fellowship of the Linnæan Society in 1843. He was not in the habit of signing introductions or prefaces to his works so that one does not get the usual addresses from which such were written, but it would appear that his ability to leave his legal calling inclined him to get as far from the metropolis as possible for he seems to have gone to Penzance at an early date, and at the age of 80 he died and was buried there.

In 1862 the second of what one might call our standard works on British shells began to appear, for apart from others of later date and modern nomenclature the work of John Gwyn Jeffreys will still retain a place on our bookshelf. The work is so very well known to all of us that it would be redundant for me to give any description of it here, and one knows how the collection which he formed was acquired by our American friends through the quibbles of our own authorities.

The perusal of the pages of the *British Conchology* reveal the names of many students and collectors of shells, such as Ashford, Bean, Boys,

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[1] Published in London, 1882, 257 pp., 62 pls.

Clark, Humphreys, Jenyns, Laskey, Lukis, McAndrew, Metcalfe, Pickering, Robertson, Sheppard, Walker, and Warren. Jeffreys read his first paper at the age of 19 before the Linnæan Society (he was born at Swansea in 1809): in his 21st year he was elected to fellowship of the Society, and at the age of 31 to that of the Royal Society, and was granted the degree of LL.D. of St. Andrew's University. He contributed papers to the *Proceedings of the Zoological Society* relative to his discoveries and expeditions among which were those in the *Valorous*, *Lightning*, and *Porcupine*. He was interested in the Newer Pliocene, and in 1861 became a Fellow of the Geological Society. He lived partly at The Priory, Ware, in Hertfordshire, and had a town house at No. 1 The Terrace, Kensington, where he died in his 77th year on 24th January, 1885.

In 1853 E. J. Lowe published a *Conchology of Nottingham* of 172 pages and 4 pages of index and errata, illustrated by 114 text-figs. He records *Limnæus glutinosus* from a still sheet of water near the Trent above the Beeston Ryelands.

Philip Henry Gosse was one of the early writers in the 'fifties, and published numerous books among which were *The Ocean*, published in 1853, *A Naturalist's Rambles on the Devonshire Coast*, with 28 coloured plates, 1853, followed by *Natural History*, *Mollusca*, 1854, with text-figures, and in 1855–6 *A Manual of Marine Zoology for the British Isles*, also in 1856 *Tenby*, *A Seaside Holiday*, with 24 coloured plates; his last work to do with shells at all seems to be *A Year at the Shore*. Gosse lived 1810–1888.

William Clarke wrote and published in 1855 *Mollusca Testacea marium Britannicorum*, *A History of the British Marine Testaceous Mollusca . . . on the basis of the organization of the animals. . . .* In his own copy he added a few MS. notes, and his paper to the *Ann. Mag. Nat. Hist.* for August, 1855, is bound up with the work. Clarke was living at Bath in 1854, the date on which he signed the preface to this book, but afterwards he appears to have moved to Exmouth.

Samuel Pickworth Woodward (1821–1865) in 1851 published part i of his *Manual of the Mollusca*, part ii in 1854, part iii in 1856: these parts were issued separately at 2*s*. each for parts i and ii and 1*s*. 6*d*. for part iii.

Part i contained the frontispiece of the Pearly Nautilus, 89 woodcuts, and plates 1 to 12, pp. viii, 158, 12.

Part ii woodcuts 90 to 223 and plates 13 to 24, pp. xii, 159–330, 13–24, 2 pp. errata and agenda, and page "Notice".

Part iii, map, woodcuts 224 to 272, pp. i–iv, xiii–xvi, 331–486 including the index.

It will be noted that the pagination is continued consecutively through the three parts together with the number of the plates. These parts formed volumes 72 to 75 respectively of John Weale's *Rudimentary Works*, that is to say part i is vols. 72 and 73 of the series; part ii, vols. 74 and 75; part iii, vol. 75. The label on my copy of part iii reads "Vol. 75, Price One Shilling and Sixpence./SUPPLEMENT/to the/Rudimentary Treatise/on/RECENT AND FOSSIL/SHELLS./By S. P. WOODWARD./London: John Weale".

This was issued again in 1856 in one complete volume. Further editions and reprints were published in 1866, 1868, 1875, 1880, and a reprint in 1890 of the "fourth edition"; a French edition was published in 1870 which formed the basis of P. H. Fischer's *Manuel de Conchyliologie*, 1880–7.

In 1868 an appendix was published by Ralph Tate, and it was also published together with the second edition of the main work in the same year, and further editions contained this appendix.

Ralph Tate (1840–1901) published *A Plain and Easy Account of the Land and Fresh-water Mollusks of Great Britain containing descriptions, figures, and a familiar account of the habits of each species.* This little book has eleven coloured plates as well as 28 little woodcuts. It was issued from the house of Robert Hardwicke in 1866, two years before he wrote his appendix to S. P. Woodward's work.

In 1896 he wrote a report on the work of the Horn Expedition, which contained Mollusca, Botany, and Palæontology of Central Australia: this seems to have been his last work except a report in collaboration with J. A. Watt the year later.

Tate in 1870 published a list of the Irish Liassic Fossils when he was interested in the Belfast Field Club, of which he had been secretary.

In 1878 Thomas Vernon Wollaston published his standard work on the *Land and Freshwater Shells of the Atlantic Islands.*

He was born at Scotter in Lincolnshire, and died at his home, Barnepark Terrace, Teignmouth, when only 56, on the 4th January, 1878, so that he did not live to see his work in book form. A certain number of his shells were purchased by the British Museum.

In 1871 appeared a little book entitled *Beautiful Shells*, by H. G. Adams (not to be confounded with the author of the *Genera*), this is more of a curio; almost all the illustrations are reversed.

M. S. Lovell wrote in 1867 a book on *Edible Mollusks of Great Britain and Ireland* and gave modes of cooking them: this was issued with 12 coloured plates.

In 1850 also George Johnson published his general work, *An Introduction to Conchology*, which appeared from the offices of Van Voorst: many copies are extant, bearing on the back the name of Gurney and Jackson. Dr. Hopwood tells me that this firm succeeded that of Van Voorst and that they bound the original stock of the work up to about 1,000, which accounts for such a number of copies of this work occurring on the shelves of the secondhand booksellers.

Since 1864 the *Zoological Record* took up the task of making available information as to workers and work, so that I do not propose to trespass on your time further, nor have I dealt with works on fossil shells, which I must leave to others.

Note.—On p. 145, 5 lines from bottom, alter the sentence beginning "This is evidently" to "This is evidently not *Tellina fabula* Gmelin but is again a West Indian introduced species".

TURTON'S BRITISH FAUNA.

By R. Winckworth.

This rather rare book is a duodecimo entitled: "British Fauna, containing a compendium of The Zoology of the British Islands: according to the Linnean System. By W. Turton, M.D. F.L.S. Vol. I . . . Swansea: 1807." As far as I can trace the second volume to contain the British insects, promised in the preface, never appeared. The preface is dated Jan. 1, 1807, but later dates appear in the text, e.g. "Taken . . . April 24, 1807" on page 133. The paper by Maton & Rackett, 1807, both pages and plates, is frequently quoted as *Linn. Trans.* viii. Reference is also made to plates, but not to pages, in Montagu's *Supplement to Testacea Britannica* which appeared late in 1808 (introduction dated 1st October, 1808), e.g. on pages 170, 180, 187–9, but some of the plates may have been available before 1808, a suggestion quite in keeping with the opening remarks of Montagu's Introduction.

It is satisfactory to find very few new names. There are a few errors in transcription, such as *Mytilus Avoensis* for *M. Avonensis* and the following new names:—

p. 133, no. 74. *Doris vermigera.* This is *Aeolidia papillosa* (L.). From Swansea.

p. 162, no. 298. *Ostrea saxatilis.* This is only a variant of *O. edulis* L. From Swansea.

p. 174, no. 394. *Murex subantiquus.* A new name for *M. antiquus* Donovan, plate 119, which however had already been renamed *M. subantiquatus* by Maton & Rackett.

p. 198, no. 585. *Patella rotula.* A new name for *P. rota* Kanmacher. Turton had already given it a new name *P. rotalis* in 1802.

A LITTLE AFRICAN SYNONYMY.

By M. Connolly.

(i) *Eremina zitteli* Bttg., 1899, and *Exiliberus jacksoni* Iredale, 1942.

1899 *Eremia zitteli* O. Bttg., *Nachr-Bl. d. Mal. Ges.*, p. 159.
1900 *Helix* (*Eremia*) *zitteli* Bttg., Kob., *Conch. Cab.*, p. 944, pl. 245 (1899), f. 1–3.
1909 *Eremina zitteli* Bttg., Plry., *Mem. Inst. Égypte*, vi, p. 16.
1924 *E.* (*Nomma*) *zitteli* Bttg., Plry., *Mem. Inst. Égypte*, vii, pp. 9–11, t.-f. 1–2.
1934 *E. zitteli* Bttg., Kaltenbach, *Arch. f. Naturg.*, pp. 399–403, t.-f. 6.
1942 *Exiliberus jacksoni* Iredale, *Rec. Austral. Mus.*, xxi, p. 126.

When O. Boettger described the remarkable shell which he called *Eremia zitteli* he failed to illustrate it, but subsequent authors have published excellent figures, and Pallary has gone to the length of making it the type of a new section, under the name of *Nomma* (an anagram of *Ammon*).

Its range is apparently confined to a limited region of the Libyan Desert, about the road leading from Mersa Matrouh to the Siwa Oasis, where, although hitherto rare, it has been picked up by several itinerant collectors, and Kaltenbach, who went very thoroughly into its distribution and affinities, seems to have established its headquarters as about 61 kilometres S.S.W. of Mersa, where typical specimens outnumbered the other local *Eremina*, *hasselquisti* Ehrn. in the ratio of four to one. He appears to adduce very good grounds, moreover, for accepting the fact that *zitteli* is not in itself a distinct species, but a geographical race of *hasselquisti*, and that its name must consequently be known as *Eremina hasselquisti zitteli.*

In 1942, however, Iredale, having received a little parcel of strange molluscs from the " Libyan Desert Plateau " and failing to find their like in literature, proceeded to publish a new and faithful description of *E. zitteli*, which he called *jacksoni*, and furthermore created for it a new genus *Exiliberus*, which he did not illustrate, as he said that " the figure given by Thiele of *Iberus gualtierianus* (*Handbuch*, p. 719, f. 761) shows its general appearance ". It is a moot point whether a genus erected on such a shadowy foundation could claim any scientific status, but fortunately the question does not arise, since *E. jacksoni* is an absolute synonym of *Eremina zitteli* Bttg., and the genus *Exiliberus* Iredale must be subordinated to *Nomma* Pallary, which, however, itself cannot stand, as it is impossible for a subspecies to belong to a section or subgenus different from that of the main species of which it forms part.

(ii) *Ennea acicula* Morelet, 1877, and *Raffraya mahéensis* Conn., 1925.

1877 *Ennea acicula* Morel., *J. de C.*, xxv, p. 338, pl. xiii, f. 3.
1925 *Streptostele* (*Raffraya*) *mahéensis* Conn., *J. of Conch.*, xvii, pp. 259, 260, f. 2.
1939 *Streptostele acicula* Morel. (= *mahéensis* Conn.), Madge, *Maur. Inst. Bull.*, i, p. 35.

When describing *mahéensis* from the Seychelles, I explained that it differed from the Comoro Is. *acicula* in little but size and geographical distribution. Madge has now (1939) recorded larger specimens of *acicula* from Mauritius and Rodriguez I. which bridge the gap between the two species, so I have naturally nothing to urge against their union, and only mention it because *mahéensis* was first published in this journal, and many of its readers may not have access to the excellent new Mauritius publication.

(iii) *Physa mosambiquensis* Clessin, 1886, and *P. waterloti* Germain, 1911.

1886 *Physa mosambiquensis* Cless., *Conch. Cab.* (*Physa*), p. 366, pl. liv, f. 4.
1911 *P. waterloti* Germ., *Bull. Mus. Paris*, p. 323, f. 57.
1925 *P. mosambiquensis* Cless., Conn., *Trans. R.S.S. Africa*, xii, p. 189.
1939 *P. mosambiquensis* Cless., Conn., *Ann. S. Afr. Mus.*, xxxiii, p. 475, f. 41.

P. mosambiquensis was described as from Mozambique (Peters) and *waterloti* from Dahomey (Waterlot). I have never seen a *Physa* from East Africa, but *waterloti* is not uncommon about the Gold Coast, and careful comparison with all published figures of *mosambiquensis* convinces me that the two are conspecific ; they are of a peculiar shuttle form, very unusual in the genus.

A LARGE RACE OF *CEPÆA NEMORALIS* L (AND OTHER MOLLUSCA) AT HIGH ALTITUDES IN THE GALTEE MOUNTAINS, CO. TIPPERARY SOUTH.

By A. W. STELFOX.

THE presence of *nemoralis* at high levels in the mountains of Co. Sligo is usually put down to the fact that these mountains are formed of Carboniferous Limestone. The Galtees, on the other hand, are composed of rocks of Old Red Sandstone and Silurian ages. It was therefore a surprise to me, on visiting the Galtees for the first time, in September, 1943, to find on the Old Red Sandstone cliffs west of Muskry Lough a large race of *nemoralis*, very like that which occurs on some of the Sligo mountains. In May–June, 1944, a few similar shells were also taken on the cliffs above Lough Diheen—also Old Red Sandstone. These Galtee specimens were taken at an altitude of between 1,800 and 2,000 feet, and *nemoralis* no doubt occurs higher than this, as the cliffs rise almost unbroken from the tarns to a height of about 2,500 ft. I was not looking for mollusca on either of my visits to the Galtees, and I regret that time did not permit me to make a thorough search for them. I can therefore assure Dr. Comfort, or anyone with an equal store of energy, that the Galtees offer quite a likely field for research to anyone interested in these large *nemoralis*.

Many old, dead, and broken *nemoralis* were seen at the foot of the cliffs above Muskry L., and most of the few living ones seen showed repairs from injuries received from being blown off the cliffs or knocked down by sheep, which scramble all over them like goats. Those taken above L. Diheen were on a shelf not invaded by sheep, had more peace and shelter, and were larger and undamaged. Specimens from Muskry L. measure about 23 mm. in width by 17 mm. in height; those from L. Diheen 23 to 25 × 20 mm.

In colour most are, like those from Sligo, reddish and unbanded, and many have white lips. One red specimen with band formula 00300 was taken in 1944, and some fragments of banded shells also seen.

Other mollusca undoubtedly occur at about 2,000 ft. above Muskry L., and a hasty search yielded *Columella edentula*, *Goniodiscus rotundatus*, *Retinella nitidula*, and *Ancylastrum fluviatile*.

The last was abundant on the wet surface of the cliffs, where it was living an almost terrestrial life, but these cliffs face east and north, and only get the sun very early in the morning during the height of summer; moreover, I fancy they are very seldom actually dry. Curiously enough I failed to find *Ancylastrum* in Muskry L. itself, though dead shells were found in the delta of a small rivulet coming down from the cliffs, but it occurred in another of the tarns, L. Borheen, and in the outlet of L. Curra, in both cases at about 1,600 feet. The only mollusca seen on the main ridge, which in Galtymore reaches an altitude of 3,018 feet, were *Arion ater*, v. *aterrima*, and *A. subfuscus*. Many of the former slug were seen eviscerated, presumably either by ravens, rooks, or hoodie crows, but I have no proof of this.

CEPÆA NEMORALIS L.—TWO LOCAL FORMS.

By A. Comfort.

In a previous paper I gave an account of two Irish forms of *C. nemoralis* from County Sligo. A good deal of breeding-work is being and has been done on *C. nemoralis*, and local races like these probably merit further description. There is a case for the systematic description of borderline forms occurring at the extreme periphery of distribution of a species, to enable them to be cited. Of the transitional *nemoralis*, var. *ponderosa* Malm. (*pura*, Westerlund), the subfossil Dog's Bay form, has already been named. The large forms from Annacoona, although belonging to the same sub-race, do not seem to fall into this variety. Until the relationships of these forms with one another and with *C. tonnensis* Sandberger are plainer, it is sufficient that the individual races should be labelled for reference and their characteristics noted.

(1) Annacoona Form (Pale Lip).

Shell large, 2·5 × 2 cm., thin, chalky white, bandless, with fine to medium transverse striations, widely umbilicate. *Periostracum* thin, lemon-yellow, rugose. *Lip and peristome* white, sharp, slightly reflected, with a small rib running up from the base of the mouth to a point near the umbilicus: interior nacreous as in var. *ponderosa. Animal* unknown.

Locality: On the face of Annacoona, Gleniff, Dartry Mts.

The shell is far thinner and more regular than in the large red forms that coexist with it, most of which have the shell as well as the periostracum tinted. The profile is almost identical with that of the Dog's Bay shells, but the weight of the specimen is about one-third that of the subfossil form. The wide umbilicus and transverse striations are sufficient to differentiate it from other living varieties. The specimen from which my account is taken is probably slightly immature, but other yellow forms in the same colony (more or less broken shells) show umbilication ranging from a perforate dimple to a deep umbilical fossa. It is scarce in the locality from a perforate dimple to a deep umbilical fossa. It is scarce in the locality. A number of heavy banded forms with brown peristomes which form a separate colony further south on the band of crags, but of which no recent shells could be found, seem indistinguishable from var. *ponderosa.*

As far as I have been able to ascertain, there is no record of the dart of any of these forms having been examined. X-ray examination of uncleaned shells of *C. tonnensis* Sandb. might conceivably reveal the dart of the extinct species, if sufficient material were examined. The X-ray of a specimen of var. *ponderosa*, kindly lent to me by Mr. Lloyd James, shows the enormously greater density of that variety, even allowing for its subfossil state, and the sealing-off of the umbilicus by the peristome.

(2) Mullaghmore Form.

Shell: High, small, and turreted, 1·25 × 1·25 cm., aperture contracted, second whorl bulging and prominent, as in a *Streptaxis*, texture thick and stony, transverse striation strong, periostracum absent, banding variable. *Animal* unknown.

Locality.—West shore of the Mullaghmore peninsula, near Clashybaun Castle, in sand dunes and grass, very numerous.

This odd, *Littorina*-like form is unlike any other variety I have ever seen. In a series from this station the degree of apertural constriction varies—one or two examples are regularly conical, but the majority have a strong bulge of the second whorl, the suture running about a quarter of the way up the whorl, as far as a point opposite the mouth, where the suture rises to its normal position. If this is a local or traumatic abnormality it should appear in other recent belts of dunes. I have a large shell showing a similar contour from Coton near Cambridge, in a fen dyke.

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SCHARFF, R. *Irish Nat.*, xv, 109, 1906.
STELFOX, A. W. *Proc. Roy. I. Acad.*, xxix, Sec. B, No. 3.

Cepæa nemoralis L. in the Dartry Mountains.—In Comfort's article (pp. 80–2 *antea*) under the above title, there is one small geographical error, due to a slip of memory. On p. 81 he refers to the " Dog's Bay and Clare Island shells ". This should read " Dog's Bay and Co. Clare shells " ! So far as I know there is no large race of *nemoralis* on Clare Island, off the coast of Co. Mayo, and the shells I showed Comfort in 1943, and which he no doubt intended to refer to, belonged to the large and well-known race found on the limestone area of north Co. Clare and on the Aran Islands in Galway Bay. Comfort's article is particularly interesting to one who has been over the ground. It is much to be desired that breeding experiments be carried out with these large races of *nemoralis*. To a limited extent I have been successful with the Co. Clare and Aran Islands form, but some brought home from Annacoona, Co. Sligo, failed to breed in captivity.

A. W. STELFOX.

Arion ater v. *albolateralis* Roebuck. When in Alfriston, Sussex E., last May I found a small colony, four in number, of the above slug. The specimens were full grown and I am satisfied that there is no mistake in the diagnosis of this characteristic form. Ellis describes it as being confined to the N. and W. of the British Isles. Roebuck in Taylor's *Monograph*, vol. ii, gives the same distribution although he proceeds to record a colony at Kingsdown, East Kent. This record was made in 1891.

L. B. LANGMEAD.

Sinistral *V. viviparus* L.—At the 9th June excursion Miss R. P. Jones, of the Leeds University Department of Zoology, took a number of the above species from the River Foss for demonstration purposes. A few days ago she wrote that among live fry taken from these adults was one sinistral specimen which she hopes to be able to rear.

W. THURGOOD.

Sinistral *L. peregra* Müller.—As has been recorded the habitat for this in King Lane Pond, Leeds, has ceased to yield, *vide* this *Journal*, vol. xxi, p. 76, 1938. Since I came to Leeds in 1936 two sinistral *L. peregra* have been found and reported; the first, immature, by Mr. J. C. North, of Huddersfield, on a Y.C.S. excursion to Woodhall Bridge, near Leeds, on 11th July, 1937; the second, mature and measuring 15 mm. in length, by Mr. Arthur Smith, of York, on 9th June last, at York, also on a Y.C.S. excursion.

W. THURGOOD.

A COLONY OF *LIMAX MAXIMUS* VAR. *CANDIDA* Less. & Poll.

By Rev. J. H. Adams.

In July, 1937, I found under a rubbish bin at the back of Landulph Church, near Saltash, Cornwall, a pure white slug which I was inclined to think was *Limax flavus* var. *albina* Taylor for which Taylor's *Monograph* gives one record of two specimens from Wurzburg, Bavaria, in 1876. I sent the specimen to the late Dr. A. E. Boycott, but asked him to return it so that I might release it again in the hope that it would breed and multiply. Dr. Boycott replied: "Very many thanks for a sight of this curious and puzzling slug. I have kept it longer than you will have liked for it took three nights to find some of our local *flavus* to compare it with alive. I do not know what it is. It *may* be *flavus*, and I dare say you are right, but (*a*) when it is crawling freely it is relatively more slender than our normal *flavus*; (*b*) the rugæ on the body surface are smaller, though this may be due to the whole slug being smaller; (*c*) when I tickle its head it waves its mantle about which *flavus* does not. The alternative seems to be a young *maximus*, though for this I should have expected a larger keel. It is I think impossible to be sure without dissecting it: I did not realize before how dependent we are on the pigmentation to identify slugs. If you can find some more perhaps one might be sacrificed; meanwhile I hope it will be fruitful and multiply." In April, 1940, I found another specimen on the churchyard path about 70 or 80 yards from where I found the first. My friend Mr. C. P. Hurst sent it to his old friend Oldham, who wrote: "... Your specimen is a very interesting one. If as I surmise the one Mr. Adams found in 1937 was like it there is a strong suggestion of an albino strain, and search will probably find others. Your slug is a complete albino; the only colour I can detect being the red eye spots. It is not full grown, but I suspect that it is a young *Limax maximus*. ... It think it would be impossible to speak with certainty in the absence of an anatomical examination. ... Why not try to rear it to maturity? I have found *L. cinereo-niger* capable of self-fertilization as no doubt *Limax maximus* would also be. If you can get your slug to breed (self-fertilized) I have no doubt that all its offspring would, like it, be albinos, assuming that it is *Limax maximus*. I do not know definitely whether *Limax flavus* can fertilize itself but suspect it can. Your slug is I think beyond doubt either *maximus* or *flavus*. ..."

I do not recollect what became of this specimen but suspect that I released it.

In 1942 I found a third specimen beneath a heap of rotting weeds in my garden about a quarter of a mile or so from the church. It was again small and apparently immature, and I kept it for several months in an entomological breeding cage. It fed almost exclusively on the fungus *Boletus granulatus* (Linn.) Fr. which is all too abundant on my lawn. It would not touch cabbage or lettuce or apple peelings, though it ate sparingly of potato peelings and, I think, bread when hard pressed, when the boletus crop came to an end. I also gave it some *Amanita phalloides* (Vaill.) Fr., the fungus so deadly to mankind which is none the less very frequently eaten by slugs. Not long afterwards it sickened and died, but I do not think the *Amanita* was to blame as the slug had looked sickly and turned an unhealthy cinereous colour before this.

About a fortnight ago I found a fourth specimen, again under a bonfire heap in my garden, and to-day came upon a fifth example. There can be no doubt therefore that Mr. Oldham was right and that there is at Landulph an albino colony. It is remarkable that every one of the five examples found has been immature—unless it should prove to be a dwarf race. I have called it *L. maximus* var. *candida* since both Boycott and Oldham inclined to this view, but I am submitting one of the two specimens I now have in captivity for exhibition at the next meeting of the Society and for dissection if thought fit. Taylor's *Monograph* gives one British record for the *L. maximus* variety—Rockingham Park, Northampton, 1896, L. E. Adams, and two European records—Italy and France. I have been unable to induce any of the specimens to perform the waving trick with their mantles which Professor Boycott referred to.

There is no *Boletus granulatus* yet available, and I have so far failed to discover what the specimen I have had for the past fortnight has fed on. A leaf of spinach beet had one small hole which I suspect was there before and a small piece of orange peel seemed to be slightly eaten but now has a plentiful growth of mould over it which does not seem to have been disturbed. There are some caterpillars feeding on grass in the same cage, and there is a certain amount of mould on the earth. Does it eat this ?—or the caterpillar fæces ? Its own fæces are pure white as were those of the others.

Dr. Jackson informs me that there is a MS. note in Taylor's copy of the *Monograph* : "Wilts. var. *candida* Chippenham, 1914 A. E. Ellis 7/1923." My present slugs, like the earlier one, are faddy about food. They would not touch young carrot, ate one small hole in a young Curly Kale leaf, refused to eat more, but relish the tender lining of broad bean pod though not touching the coarse pod itself.

Planorbis corneus in Herts.—In the 1944 issue of the *Transactions of the Herts Natural History Society*, a record of a Field Meeting of 17th April, 1943, has this note :—

"A feature of interest was a large number of red *Planorbis corneus* in the Apostle's Pool, Chipperfield Common, doubtless introduced by dealers in aquarium objects, using the pond as a breeding ground."

I visited the pond on 7th April, 1945, and found the snails present in very large numbers. The shells are generally small, and appear black, but when cleaned of the confervoid growths, are a dark horn colour and semi-transparent. They are more fragile than the normal *corneus*. The animals are a bright blood-red, and, in cleaner specimens, show through the shells, giving them a very rich colour.

I have been unable to confirm the suggestion regarding the introduction of the snails by "dealers". Although *corneus* is not a particular snail with regard to habitat, the Apostle's Pool is not a pond one would choose for breeding. It is surrounded by large trees, is choked with leaves, and has little weed, some Hornwort and Duckweed. It is poorly lit, and the water far from clean, with bubbles from vegetable decomposition rising to the surface. *Sphærium corneum* is also plentiful in the pond.

L. W. STRATTON.

ACCOUNTS FOR THE YEAR ENDING 31st DECEMBER, 1944.

Income and Expenditure Account.

Dr.	£	*s.*	*d.*	£	*s.*	*d.*
To Annual Subscriptions—						
For 1944—						
59 (and part) at 10*s*.	29	15	4			
3 at 5*s*.		15	0			
Paid in 1943	2	11	8			
Arrears	4	10	0			
				37	12	0
,, Sales				10	5	6
By Transference from Life Fund				15	7	0
Deficit, being amount of year's Income *below* Expenditure				20	19	7
				£84	4	1

Cr.	£	*s.*	*d.*	£	*s.*	*d.*
By publication and distribution of *Journal*—						
Vol. XXII, Part 3	33	11	6			
Ex do. Reprints	2	13	0			
				36	4	6
Vol. XXII, Part 4	33	12	10			
Ex do. Reprints	5	11	10			
				39	4	8
,, Printing and Stationery				–	–	–
,, Fire Insurance					10	0
,, Warehousing Stock				1	10	0
,, Subscriptions—						
Malacological Society	1	1	0			
Lancs. and Chesh. Fauna Com.		5	0			
Zoological Record		8	0			
Donation do. Fund	2	0	0			
				3	14	0
,, Officers' Expenses—						
Secretary	1	0	0			
Editor		10	11			
Treasurer	1	10	0			
				3	0	11
				£84	4	1

Life Membership Fund.

	£	*s.*	*d.*
To Amount of Fund, 1st January, 1944	355	4	0
,, Dividend and Interest	15	7	0
	£370	11	0

	£	*s.*	*d.*
By Transfer to Income and Expenditure Account	15	7	0
,, Amount of Fund, 31st December, 1944	355	4	0
	£370	11	0

Research Fund.

	£	s.	d.		£	s.	d.
To Amount of Fund, 1st January, 1944	340	19	2	By Amount of Fund, 31st December, 1944. Cap.	200	0	0
,, Dividend and Interest	14	16	9	,, Accumulated Interest	155	15	11
	£355	15	11		£355	15	11

BALANCE SHEET.

Liabilities.

				£	s.	d.
Annual Subscriptions in advance				3	15	8
Life Membership Fund				355	4	0
Research Fund				355	15	11
Balance of Income and Expenditure Account—						
As on 1st January, 1944	212	19	2			
Less Deficit for 1944	20	19	7			
				191	19	7
				£906	15	2

Assets.

	£	s.	d.	£	s.	d.
Investments.						
4% Funding Loan, £408 4*s.* 11*d.*, cost				350	0	0
3% Defence Bonds				200	0	0
3½% War Loan, £40 11*s.* 8*d.*, cost				40	0	0
Cash at Banks—Nat. Prov.	36	5	0			
P.O.S.B.	280	10	2			
				316	15	2
				£906	15	2

NOTE.—Assets in addition to those set out in the Balance Sheet are (*a*) Library, (*b*) Cabinets and Collections, (*c*) Stock of unsold publications, (*d*) Annual Subscriptions in arrears, but against this as a liability is the cost of Vol. XXII, Part 5, issued in December and for which the accounts (amounting to £32 7*s.* 8*d.*) were not received in time for the above statement.

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Income and Expenditure Account.

Dr.	£	*s.*	*d.*	£	*s.*	*d.*
To Annual Subscriptions—						
For 1945—						
64 at 10*s.*	32	0	0			
3 at 5*s.*		15	0			
Paid, 1944	3	15	8			
Arrears	5	16	6			
				42	7	2
,, Sales				7	1	9
,, Donation					10	0
,, Transfer from Life Membership Fund				15	8	0
,, Deficit, being amount of year's income below expenditure				22	3	9
				£87	10	8

Cr.	£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*
By Publication and Distribution—									
Vol. 22, pt. 5	28	19	11						
Do. Reprints	3	12	9						
				32	12	8			
Vol. 22, pt. 6	36	16	2						
Do. Reprints	5	0	7						
				41	16	9			
							74	9	5
,, Printing and Stationery							1	10	0
,, Fire Insurance								10	0
,, Warehousing Stock							1	10	0
,, Subscriptions—									
Malacological Society				1	1	0			
Lancs. Faunal Com.					5	0			
Zool. Record					8	0			
							1	14	0
,, Officers' Expenses							7	17	3
							£87	10	8

Life Membership Fund.

	£	*s.*	*d.*
To Amount of Fund, 1st January, 1945	355	4	0
,, One Life Membership Fee	6	6	0
,, Dividends and Interest	15	8	0
	£376	18	0

	£	*s.*	*d.*
By Transfer to Income and Expenditure Account	15	8	0
,, Amount of Fund, 31st December, 1945	361	10	0
	£376	18	0

Research Fund.

	£	s.	d.		£	s.	d.
To Amount of Fund, 1st January, 1945	355	15	11	By Amount of Fund, 31st December, 1945 (Capital)	200	0	0
,, Dividends and Interest	15	8	8	,, Interest transferred to Cash Account (Nat. Prov. Bank)	100	0	0
				,, Balance of Accumulated Interest	71	4	7
	£371	4	7		£371	4	7

BALANCE SHEET.

Liabilities.		£	s.	d.	Assets.		£	s.	d.
Annual Subscriptions in Advance		6	7	6	4% Funding Loan		350	0	0
Life Membership Fund		361	10	0	3% Defence Bonds		200	0	0
Research Fund		271	4	7	3½% War Loan		40	0	0
Transfer from Research Fund		100	0	0	Cash at Bankers—				
Balance Income and Expenditure Account—					National Provincial	101 5 1			
As on 1st January, 1945	191 19 7				Post Office Savings Bank	217 12 10			
Less Deficit for 1945	22 3 9						318	17	11
		169	15	10					
		£908	17	11			£908	17	11

Note.—Assets in addition to those set out in the Balance Sheet are (*a*) Library, (*b*) Cabinets and Collections, (*c*) Stock of unsold publications, (*d*) Annual Subscriptions in arrears; but against this as a Liability is the cost of vol. xxii, part 7, of the *Journal* issued in November and for which the accounts (amounting to £42 9*s*. 1*d*.) were not received in time for the above statement.

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A. Tindell Hopwood.
S. P. Castell.
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THE

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VOL. 22. 8th MAY, 1946. No. 8

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SOME *PISIDIA* FROM THE TARNS OF THE GALTEE MOUNTAINS, CO. TIPPERARY SOUTH.

By A. W. Stelfox.

There are four corries on the northern slope of the Galtees in which nestle five moraine-dammed tarns of varying size. These tarns lie at altitudes of from 1,600 to 1,900 feet. Several of the tarns have no proper outlet, and consequently the water level varies considerably according to the rainfall. In September, 1943, all the tarns were so full that I was unable to reach any habitat for *Pisidia*, while in 1944 (May–June) the level of all was much below the mean level and some of the beds of mud were well above water level. Taking the tarns in order from west to east I failed to find any in Lough Curra, though I have no doubt they occur beyond the reach of a scoop. L. Diheen yielded six specimens of a small rather starved form of *P. cinereum* (*casertanum*), with quite thick shells. These came from a stiff, red, cheesy mud, on the southern shore of the tarn, quite 10 feet below the water level of September, 1943. L. Borheen yielded four specimens of a corresponding form of *P. nitidum*, almost thick enough to be regarded as a form of var. *crassa*. From the largest of the tarns, Muskry L., I only succeeded after a long search in obtaining two specimens, one each of *P. nitidum* and *P. subtruncatum*, both with rather thick shells. The fifth—a small shallow tarn, separated from Muskry L. by an inner moraine, and at a slightly higher altitude—was the only one in which *Pisidia* were plentiful (i.e. within my reach). Here I took many specimens in a few minutes of two species, *P. nitidum* and *P. hibernicum*, in about equal numbers, but with rather thinner shells than those from the other tarns.

Parthenogenesis in Paludestrina jenkinsi (Smith).—A single specimen of the above was placed in a small glass aquarium in May, 1944, In March, 1945, there were six specimens of various sizes. In September, 1945, four had reached adult size and 19 could be counted. The only kind of plant life in this aquarium is two species of algal growth. The surface area of the water in the vessel is 4½ in. by 1¼ in., being 3½ in. deep. The val of water is considerably less than one pint.

A. S. Cook.

Pyramidula rotundata var. *alba*.—In continuance of my previous note in the *Journal of Conchology*, vol. 22, No. 5, page 108, three more specimens of this variety have been found in the Doncaster district, at Norton Road, on 15th July, 1945, at Conisborough Castle on 22nd July, 1945, and at Levitt Hagg on 5th August, 1945. These specimens have been kept alive along with one which was recorded in my previous note (Levitt Hagg); pieces of limestone covered with moss were placed in the vessel in which they were confined. Their sole food seems to have been the algal growth which appeared densely on the interior of the glass. Though active throughout the season no progeny has appeared to date.

A. S. Cook.

CARL MARINUS STEENBERG (1882-1946).

By Hans Schlesch, D.Sc.

In Copenhagen died on 1st February, 1946, Professor Dr. C. M. Steenberg after a long sickness, only 63 years old. Born in Vester Brønderslev, in North Jutland, on 24th November, 1882, he was a student from the Østre Borgerdydsskole in Copenhagen, 1902; Mag. Scient., 1909, Assistant in the Histological Laboratory of the Copenhagen University, 1908; Lecturer in Comparative Anatomy, 1923; Dr. Phil., 1925; and Professor in this, 1929; later also in Histology and Embryology, and leader of this Institute founded by Professor Dr. Rudolph Bergh.

Steenberg was prominent in Zoological microtechnique and his publications, especially the illustrations of minute Mollusca and their anatomical structure, are highly valued and appreciated. Unfortunately he only issued rather few works; the first appeared already in 1911 concerning the Danish land snails, a very useful work in respect of the illustrations, especially of Pupillidæ and Clausiliidæ, though now antiquated; further to be mentioned are that on the anatomy of the Danish Clausiliidæ (1914), on the Molluscan fauna of the lake "Furesø" in North-East Zealand (1917), on the anatomy of *Acanthinula* and *Vallonia* (1918), and his most valuable contribution, the Dissertation on the Anatomy and System of the Pupillidæ (1925).

Steenberg married Johanne Møller, a daughter of the town-mayor, H. C. V. Møller; she survives him, but there are no children. He possessed an extremely valuable library and collection. Steenberg was a member of the Conchological Society from 1915.

Arion ater var. albolateralis Roebuck.—On 28th September, 1945, I found a single adult specimen of this slug at Letchmore Heath, near Watford, Herts. This, and Mr. Langmead's record for East Sussex, suggests that this beautiful variety may be more widely distributed than was previously supposed.

L. W. Stratton.

Milax sowerbyi (Fér.) in Woodland.—The occurrence of *M. sowerbyi* in wild places is so unusual as to be worth recording. In September, 1945, I found it in natural oak-hazel woods on the steep slopes of Netton Cleave, Hennock, South Devon, at a considerable distance from habitations. With it were *Arion subfuscus*, *A. intermedius*, *Limax maximus*, and *L. arborum*. Boycott (*J. Ecol.*, 22, 1934, p. 19) mentions the occurrence of *M. sowerbyi* in wild habitats at Salcombe, Devon, and remarks that "occasionally in the south-west it seems to be wild". The three British species of this genus, *M. sowerbyi*, *M. gracilis*, and *M. gagates*, live commonly together in gardens and cultivated fields in South Devon, for instance, near Exeter.

A. E. Ellis.

THE MATING PROCESS IN *ARION HORTENSIS*, FÉRUSSAC, AND IN *ARION SUBFUSCUS*, DRAPARNAUD.

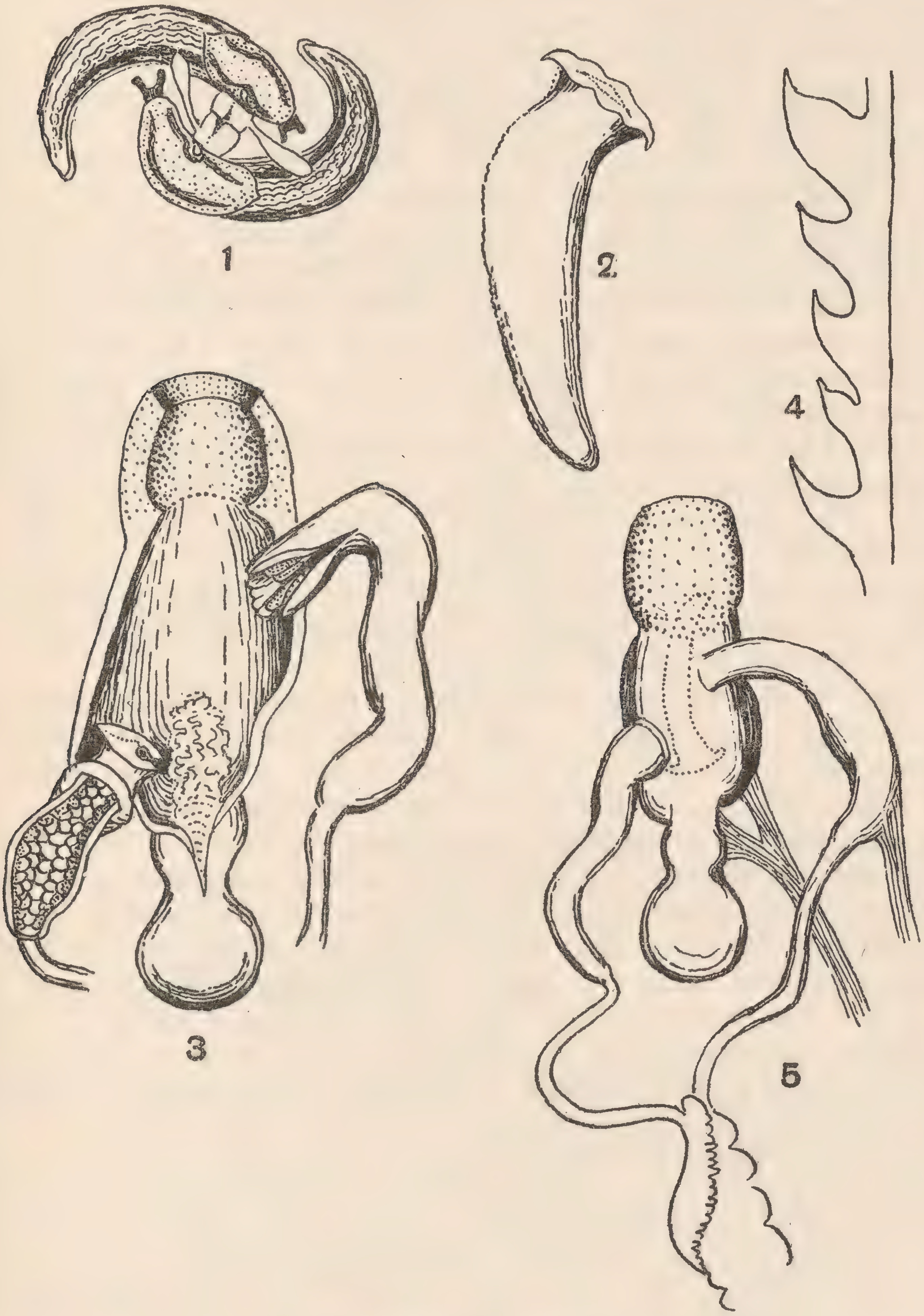
By H. E. Quick.

Arion hortensis Fér.

Although *Arion hortensis* Fér. is such a common species in Britain, no detailed account of the mating process in this country is known to me, and the literature contains some statements at variance with my observations on slugs attributed to this species in Wales.

Fig. 5 shows the form of the genitalia, from which it will be seen that the yellow (stippled) lower atrium is smaller than the white upper atrium. The distal portion of the free oviduct is dilated and has thin walls while the proximal part is more slender, white and opaque, with thicker walls. The retractor muscles of the oviduct and neck of the spermatheca arising from the diaphragm just behind the kidney and close to the left cephalic retractor are sometimes completely separate muscles, and sometimes united for more or less of their length. A branch from the spermatheca retractor goes to the apex of the atrium. There is no adhesive organ or ligula surrounding the orifice of the oviduct such as occurs in *Arion ater* Lin. Immediately after coitus the spermatophore is found in the atrium with its chitinous head firmly adherent to the apex of the upper atrium, occluding the entrance of the spermatheca duct, with the small end projecting downwards and reaching a little way into the lower atrium. It differs therefore in position, as well as in shape from that of *Arion subfuscus* which resembles that of *A. ater*.

The spermatophore, Figs. 2 and 4, is five millimetres long and is shaped like a clove. It has thin chitinous walls and (in alcohol) pale coagulated contents, and the head is a thickened chitinous disc with a crenulated edge. A single ridge of about fifty-six serrations runs from base to apex on the convex side, the serrations becoming smaller at each extremity. As in other species of *Arion* the serrations point towards the direction in which the spermatophore travels during coitus, so they are not adapted for facilitating its progress. In *A. ater* and *subfuscus* at any rate it may be that they help to fix the spermatophore and so facilitate its longitudinal rupture to liberate the sperms. What happens in *A. hortensis* where the head is glued to the apex of the atrium is unknown. F. Oekland in "Arionidæ" of Norway describes the spermatophore of *A. circumscriptus* as filling and stretching the spermatheca, with its base firmly adherent to the mouth of the duct, i.e. in a position directly opposite to that found in *A. hortensis*, directly after coitus. It is difficult to see how the *hortensis* spermatophore could subsequently attain the position found in *circumscriptus*. Does the head of the spermatophore dissolve and liberate the sperms into the sac? J. W. Taylor (*Monograph*, vol. 2) states that there are no serrations in *hortensis*, and that the spermatophore is surrounded by a sheath, but I have only found a coating of albuminous fluid coagulated by alcohol and easily brushed off, such as occurs in many other spermatophores. Seeing that *A. ater*, *subfuscus* and *circumscriptus* have serrations one would expect to find them in *A. hortensis* too. The sac contains a reddish fluid even when an intact spermatophore is present in the atrium, and in greater volume than the contents of the spermatophore, so it cannot be wholly derived from the spermatophore though part of it



Arion hortensis Férussac.

FIG. 1.—Pair in copula.
FIG. 2.—Spermatophore, × 8.
FIG. 3.—Atria and epiphallus laid open to show the orifices of the oviduct, spermatheca and epiphallus, × 8.
FIG. 4.—The serrations of the spermatophore, × 200.
FIG. 5.—The distal parts of the reproductive organs showing the retractor muscles and the spermatophore which is not actually visible until the atrium is opened, × 6.

could be derived from a previous coitus. Fig. 3 shows the opened atria and how the epiphallus conforms to the shape of the spermatophore or rather vice versa.

Fig. 1 shows a pair of *A. hortensis* in cop. with the genitalia fully everted. The pair was found already in copula at 2.0 p.m. on 7th December, 1944, in a garden and carefully transferred to a glass tube without disturbance. The mass of the conjoined atria is relatively large, and the position of the spermatheca duct and epiphallus can be seen through the translucent bluish white atria. There is, however, a marked difference from the state of affairs in *Arion ater* described and figured by L. Adams in the *Journal of Conchology*, vol. xiii, pp. 116–119, and described by U. Gerhardt, *Zeitschrift fur Morphologie und Oekologie der Tiere*, 30 Band, 2 Heft, 1935. The adhesive organ or ligula is not present in *A. hortensis*, but a long finger-like process emerges anteriorly from the base of the everted atria. This process lengthens and shortens and wanders about over the side of the partner's head, neck, and foot, but does not adhere to them. Functionally it is reminiscent of the sarcobelum of *Agriolimax*. Subsequent dissection of the pair fixed in alcohol, showed that it is the evaginated oviduct. This stimulatory adaptation of the oviduct is curious and must be very unusual. The pair remained on the same spot during coitus with the tentacles half out, and occasionally licked each other's mucus. They separated at 3.40 p.m. and the genitalia were rapidly withdrawn, so coitus lasted at least one hour and forty minutes.

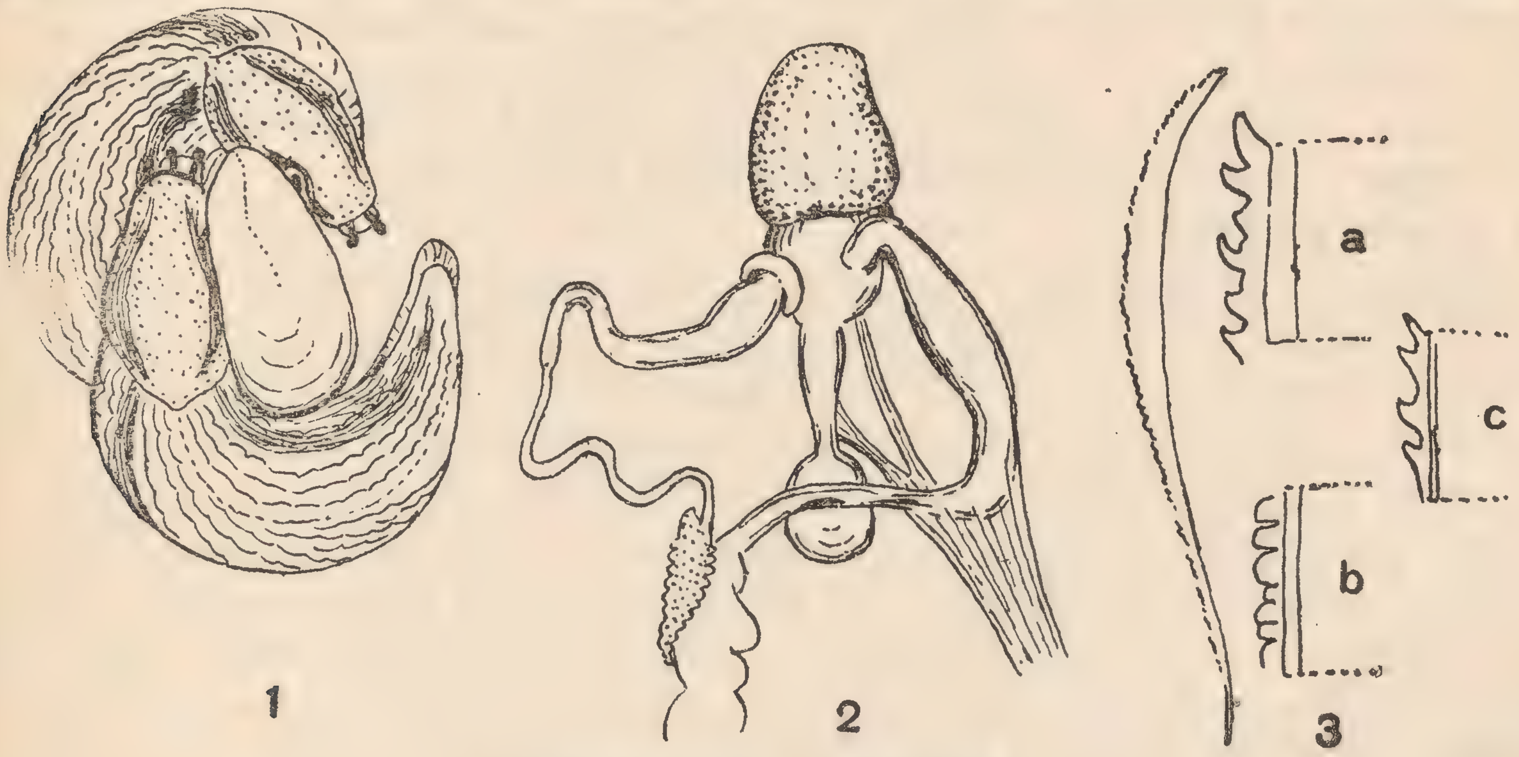
On 17th April, 1945, a pair was found "following" under a stone in the garden at 4.0 p.m. and brought indoors. At 5.15 p.m. they were encircled and the yellow lower atria were slightly everted and withdrawn about once a minute. A little of the upper atrium was sometimes seen with a small anterior protrusion. At 5.45 p.m. the atria were fully everted, swollen and translucent, with the lower atrium stretched to a narrow yellow band close to the body. The epiphallus and spermatheca duct were visible through the translucent wall of the upper atrium, and the digitate evaginated oviduct wandered about as in the previously observed case. At 7.15 p.m. the animals made slight movements and licking and biting one another was resumed, so they were flooded with 70 per cent alcohol and preserved in good extension. The actual coitus had lasted therefore at least one hour and thirty minutes.

Gerhardt, *Zeitschrift fur Morph. und Oek.*, 30 Band, 2 Heft, July, 1935, describes the mating process of *A. hortensis* as only lasting for twenty-five minutes, and the everted genitalia as smoother, more featureless, and relatively smaller than in *A. ater* or *empiricorum*, and the spermatophore as without serrations. He makes no mention of the very striking feature presented by the everted oviduct. Although Gerhardt's description of the external appearance of his slug agrees with what we call *A. hortensis* Fér. it seems probable, or at least possible, that more than one species has been included under that name. Again, Taylor quotes Lowe as stating that actual congress, during which the spermatophores are exchanged, only lasts for forty-five seconds. This statement is too brief to make it certain what is meant exactly, and as I could not detect the actual passage of the spermatophores through the ducts, one cannot draw any conclusion from it.

Arion subfuscus Draparnaud.

Although *Arion subfuscus* Drap. is a common species, accounts of its mating are few and incomplete.

Fig. 2 shows the distal parts of the reproductive organs. The upper atrium is relatively smaller than it is in the " *ater empiricorum* " group, on which observations are still in progress. A small pad or cushion extends from the entrance of the free oviduct down a little way into the lower atrium, but does not surround the orifice like the ligula of the *ater* group, but seems to correspond with it. In contrast to *ater* the distal part of the free oviduct is dilated, though not so much as it is in *hortensis*. The oviduct enters the upper atrium low down on the right-hand side in front, as it does in *hortensis*, and not near the apex and behind as it does in *ater*. The epiphallus enters the atrium on the left-hand side like *hortensis*, whereas in *ater* it enters on the right. The terminal ridge or collar is more pronounced than in *ater*, and much more so than in *hortensis*. Though the distal part of the oviduct is dilated, there is nothing corresponding to the mobile digitate evagination during coitus that is seen in *hortensis*, and the appearance of the everted organs closely resembles that of the *ater empiricorum* group. The spermatophore resembles that of the *ater empiricorum* group, and is very different from that of *hortensis*. It measures about fifteen millimetres in length, and the serrations are very much like those of *ater-empiricorum*, but in a group on each side of the middle of the spermatophore they are blunt.



Arion subfuscus Draparnaud.

FIG. 1.—Pair in copula.
FIG. 2.—The distal parts of the reproductive organs, × 4.
FIG. 3.—The spermatophore, × 4.
(*a*) Serrations near the head, × 80.
(*b*) Serrations near the centre, × 80.
(*c*) Serrations near the tail, × 80.

On 16th April, 1945, I witnessed an incomplete attempt at coitus by a pair of *A. subfuscus* in captivity in a glass jar. At 6.30 p.m. they were seen " following ", the follower licking the caudal mucus of the followed. This continued until 7.15 p.m. when they curved into the usual circle, close together and motionless, with the tentacles half extended. Between 7.15 p.m. and 7.45 p.m. the lower atria appeared as small yellow eminences from time to time, and were again withdrawn. The respiratory orifices were nearly closed. At 8.0 p.m. slight movements and renewed licking began, and they crawled apart. Subsequent dissection showed that there were no spermatophores in either the spermathecæ or in the epiphalli.

On 18th April, at 8.45 p.m., another pair was observed following and at 9.15 p.m. they were encircled. At 9.30 p.m. the atria were fully everted, the whole mass making a large blunt rounded cone with the apex upwards, see Fig. 1. The junction of the partner's atria was barely visible as a faint line. The combined mass was larger relatively than in *hortensis*, and closely resembled the condition in *ater empiricorum*. At 10.45 p.m. the animals quickly separated, the atria were rapidly withdrawn, and the spermatophores were momentarily seen partly protruding from the spermatheca ducts. Shortly after one animal was dissected and the spermatophore found partly in the duct of the spermatophore and partly in the atrium. The small end lay just within the oviduct, though this latter situation was probably accidental, and not a regular occurrence. The other partner laid eggs in several batches from 3rd May to 18th May, i.e. three weeks to a month later.

Gerhardt, *Zeitsch. fur Morph. und Oek.*, Band 36, April, 1940, says that he witnessed a mating of this species in 1937 at Petersberg, near Halle, at about 3.0 p.m. The pair had formed the usual circle on the ground. In the genital area the atria were visible as small white eminences, recalling the picture in *A. circumscriptus*. After a short time the atria were withdrawn, together with the spermatophores. On this one observation, which he states is the only one he has been able to make on this species, he makes the following comment: "According to Simroth, 1885, *A. circumscriptus* and *subfuscus* belong to the Monatriidæ, while the *empiricorum* and *hortensis* group are Diatriidæ, i.e. two divisions of the atrium are present in contrast to the first group where only one is present. P. Hesse and others say that this criterion is not universally applicable, but in the present case we clearly see that the absence of the upper atrium is indicated in copulation by the smallness of the outwardly visible parts, and that the large protruding masses seen between the necks of a pair in *A. empiricorum* and *hortensis* are mainly composed of the upper atria."

Comparing Gerhardt's observations with mine, it seems probable that what he witnessed was only the last stages of a complete mating (the spermatophores were seen on separation), when the atria had already begun to shrink.

In all our British species of *Arion* I have seen a yellowish lower atrium and a white upper atrium, though the relative size of the two varies from species to species. Although the upper atrium is relatively large in *empiricorum* and small in *subfuscus*, and the free oviduct is uniform in the former and dilated distally in the latter, these differences are not reflected in the appearance of the conjoined mass of the everted organs; apparently the smaller upper atrium of *subfuscus* is more distensible than that of *empiricorum*. Again a dilated distal portion of the oviduct as in *subfuscus*, does not necessarily mean that it will be everted as the similarly dilated oviduct is in *hortensis*. It also seems that for the British species at least, a distinction into Monatriidæ and Diatriidæ is unfounded.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN AND IRELAND.

674th Meeting (Annual Meeting), held at The British Museum (Nat. Hist.), London, 6th December, 1945.

The President, Mr. A. E. Salisbury, in the chair.

Present: Lt.-Col. Bensley, Messrs. A. Blok, C. P. Castell, G. L. Wilkins, A. S. Cook, A. E. Ellis, A. P. Gardiner, L. W. Stratton, E. Stainton, B. Verdcourt, Dr. A. T. Hopwood, Mrs. Morehouse, Lt.-Col. A. J. Peile, Dr. Kathleen White, and Mrs. Wheatley (visitor).

Apologies for absence were received from Dr. J. W. Jackson, J. R. le B. Tomlin, Rev. J. H. Adams, R. Winckworth.

Election of Scrutineers.

Col. Bensley and Mr. Blok were elected scrutineers.

Election of Auditors.

Dr. Hopwood and Mr. Kennard were elected Auditors.

Candidates proposed for Membership.

Reginald Wright Barker, M.A., 16 Duchy Road, Harrogate (introduced by J. R. le B. Tomlin and Arthur Blok).

S. Stillman Berry, 1145 West Highland Avenue, Redlands, California (introduced by A. E. Salisbury and A. T. Hopwood).

Warren R. Dawson, Simpson House, Simpson, Bletchley, Bucks (introduced by J. W. Jackson and A. E. Salisbury).

Johannes G. J. Kniper Lezenscheweg, Bilthoven, Holland (introduced by H. Schlesch and A. E. Ellis).

David Northey Richardson, The Mark, Langdon Wood, Keston, Kent (introduced by F. Taylor and J. R. le B. Tomlin.)

A. H. Turner, Forest Drive, Bickenhall, Hatch Beauchamp, Taunton, Somerset (introduced by J. W. Jackson and A. E. Salisbury).

Leonardus Alphonsus Wilhelmus Cornelis Venmans, Tolsteegsingel 13, Utrecht, Holland (introduced by H. Schlesch and A. E. Ellis).

W. J. Watts, 77 Hayes Way, Beckenham, Kent (introduced by A. S. Kennard and A. T. Hopwood).

S. V. Wild, M.Sc., 35 Green Drive, Timperley, Chesh. (introduced by A. K. Lawson and J. W. Jackson).

Anthony D'Attilio, 102 Hilltop Acres, Yonkers, N.Y. (introduced by J. R. le B. Tomlin and Wm. H. Weeks).

Reports.

The Annual Report of the Council; Reports from the Staffordshire and Yorkshire branches and the Report of the Recorder for Marine Mollusca were read and adopted.

The President announced the death of Mr. Duncan Keogh in February last. A vote of condolence was passed, all present standing.

The President announcing the retirement of Dr. J. Wilfrid Jackson and Mr. R. Winckworth as Secretary and Trustee respectively moved a special vote of thanks from the chair to Dr. Jackson for all his work on behalf of the Society during the past thirty odd years. Dr. Jackson was regarded as an institution in the Society, indeed, he was the Society in many respects. The President went on to say that Dr. Jackson had at first filled the office of Librarian and then of Hon. Secretary and every member who came into contact with him experienced Dr. Jackson's kindness and help and on visiting the Society's Library and Collections found in him a friend very willing to hold out a helping hand. Indeed, he had been a guiding star to a succession of the various Presidents and officers. The President expressed his personal gratitude for all the kindness and help received from Dr. Jackson and was sure that all members would wish to convey their hope for Dr. Jackson's future happiness and well-being. Dr. Hopwood and Mr. Ellis supporting the motion expressed the hope that the President's remarks be recorded in our Journal ; they heartily concurred with all he had said and wished to associate their names with the motion. The motion was then put to the meeting and carried amidst unanimous applause.

Election of Officers and Council for 1945–6.

The Scrutineers reported that the Officers and Council as nominated and published on the ballot papers had been duly elected (see page 175).

The retiring President then vacated the chair which was taken by Dr. Hopwood amid applause.

The retiring President then delivered his address on " A Copse in the Cotswolds ".

A lively discussion followed relative to the habitats of snails and other ecological items.

A vote of thanks to the retiring President for his address, followed by votes of thanks to retiring Officers, Scrutineers and Auditors, to the Trustees of the British Museum (Nat. Hist.) and to the Manchester University authorities concluded a most enjoyable meeting.

Exhibits.

By A. E. Salisbury : Specimens illustrative of his address.

By Dr. Hopwood : Recent literature on the L. and F.W. Moll. of Belgium, and specimens from some of the localities.

By Rev. J. H. Adams : *Limax maximus* var. *candida* L. and P. (probably) from Landulph, near Saltash, Cornwall ; see *supra* pages 171, 172. Mr. Hugh Watson has offered to dissect the slug and determine its identity.

By A. S. Cook : Malformed *L. stagnalis* from a pond near Walsall ; *L. stagnalis* devoured by *Dytiscus marginalis ; P. jenkinsi* used by a caddis-fly to construct its case ; extremely thin, flexible shell of *H. aspersa* from Edlington Lane.

By B. Verdcourt : Photos showing effect of change of environment on *L. peregra* ; photos of the new species *Pila aldersoni* and *Pila hollingsworthi* Pain, and of the radula of *Marisa cornu-arietis* L. to illustrate the use of the stain Chlorazol Black E.

By Lt.-Col. A. J. Peile : Mascarene Pupillidae, Arabian *Granopupa* ; radulæ of *Ena montana* and *E. obscura* to illustrate the President's address.

By L. W. Stratton : *C. nemoralis* from Dorset, 13 per cent being hyalozonate, and from Aldenham.

By G. L. Wilkins : *Pholas dactylus* L., *Barnea candida* L., *B. parva* Pennant, and other mollusca from Red Sandstone at Exmouth, Devon, as well as models of *Pholas in situ.*

By Mrs. Morehouse : Live *Janthina britannica* F. and H. from Trawalua strand, Sligo ; *C. nemoralis* from Irish and Welsh localities ; *Cochlicella barbara* L. from Bundoran ; *Hydrobia ulvæ* Pennant from Bramham Cross Roads, Leeds, and other species.

By the Marine Recorder : Distribution maps and examples of *Chlamys nivea* Macg., *Mangelia powisiana* Dtz., *M. r. derelicta* Reeve, *Divaricella divaricata* L., *Irus irus* L., *Philbertia leufroyi boothii* Smith, *Chrysallida obtusa* Brown, *Berthellina engeli* Gdr., and *Ammonicera tricarinata* Webster ; also series of *Succinea oblonga* from Braunton and the north.

ANNUAL REPORT.

This is the Sixty-Ninth Annual Report of the Council. Since the last Annual Meeting the Society has lost four members by death, namely Mrs. L. A. Smith, Messrs. Lionel E. Adams, G. C. Spence, and G. C. Robson. Mr. Adams had been a member since 1885. Seven new members have been elected, and the membership is now approximately 200.

With the cessation of hostilities there has been a gradual resumption of our foreign contacts, and the Council has learned with pleasure that the great collections in Paris and Brussels are safe. At home it has not yet been possible to arrange regular meetings of the Society.

Two parts of the Journal (Vol. 22, nos. 6 and 7) have been issued.

The Council has received with regret the resignation of the Honorary Secretary, Dr. J. W. Jackson. Dr. Jackson has held office in the Society for thirty-nine years, first as Librarian and then as Secretary, and the Council desires to record its deep appreciation of the many valuable services which he has rendered to the Society.

YORKSHIRE CONCHOLOGICAL SOCIETY.

At a meeting held on 3rd March last year Dr. H. C. Versey gave an instructive address on Estuarine Mollusca. The excursion to York on 9th June worked the River Ouse for a short distance down from Blue Bridge, and then worked from Monk Bridge to Yearsley Bridge, taking fifteen species in the River Foss.

The membership remains at 22, the honorary members being now only three, owing to T. Sheppard's death.

W. Thurgood,
Hon. Secretary.

NORTH STAFFORDSHIRE BRANCH.

Last September W. Hill found *H. fusca* under decaying leaves of Butterbur in Dimmingsdale, at the edge of the top pool ; he also found *T. cantiana* quite common at Cheddleton in the spring of 1945. B. Bryan took one *Vertigo antivertigo* at Betley Mere last April, probably a new record for North Staffordshire.

B. Bryan,
Hon. Secretary.

A NEW BRITISH *JANTHINA*

By T. G. W. Fowler.

[Plate 1.]

On 12th January and the two following days my wife and I picked up about 130 live *Janthina*, all with floats attached, along Gwenber, a small bay just below our house, and along the larger Whitesand Bay.

The rather violent south-south-west storm ceased, with the wind coming into the west and north-west facing here.

They have been pronounced by Winckworth to be *J. planispirata* (A. Adams & Reeve) described in the *Zoology of the Voyage of H.M.S.* Samarang, p. 54, pl. xi, f. 10, 1850, from the Atlantic Ocean. No record of *planispirata* on British shores seems to have occurred before, and mid-winter records of any other *Janthinæ* are very few. Miss Hoskin took young living specimens of *rotundata* at Hayle in January (this *Journal*, ix, p. 338), and Marshall records a considerable fleet in Jersey in mid-winter, 1916 (this *Journal*, xv, p. 174).

The fact that we got nearly all in perfect condition and with floats seems due to the comparative calm at the time, and that it was in the middle of neap tides. This means that, although they were distributed fairly evenly on the sand all along Whitesand Bay nearly to Sennen Cove, they were not thrown up among the rocks and boulders, as the high tide does not quite reach so far.

In the original description of this species the authors say: "Chiefly distinguished by its narrow, compressed mode of convolution, by which the spire is unusually depressed." They do not give any dimensions; their figure measures about 26 mm. in breadth by 18 mm. in altitude.

Reeve, who quotes the name incorrectly as *planospirata*, says that it is white-banded round the columella.

Vertigo moulinsiana Dupuy in West Sussex.—On 6th October, 1945, whilst spending a few days near Petersfield I was fortunate in finding a large colony of *Vertigo moulinsiana* Dupuy.

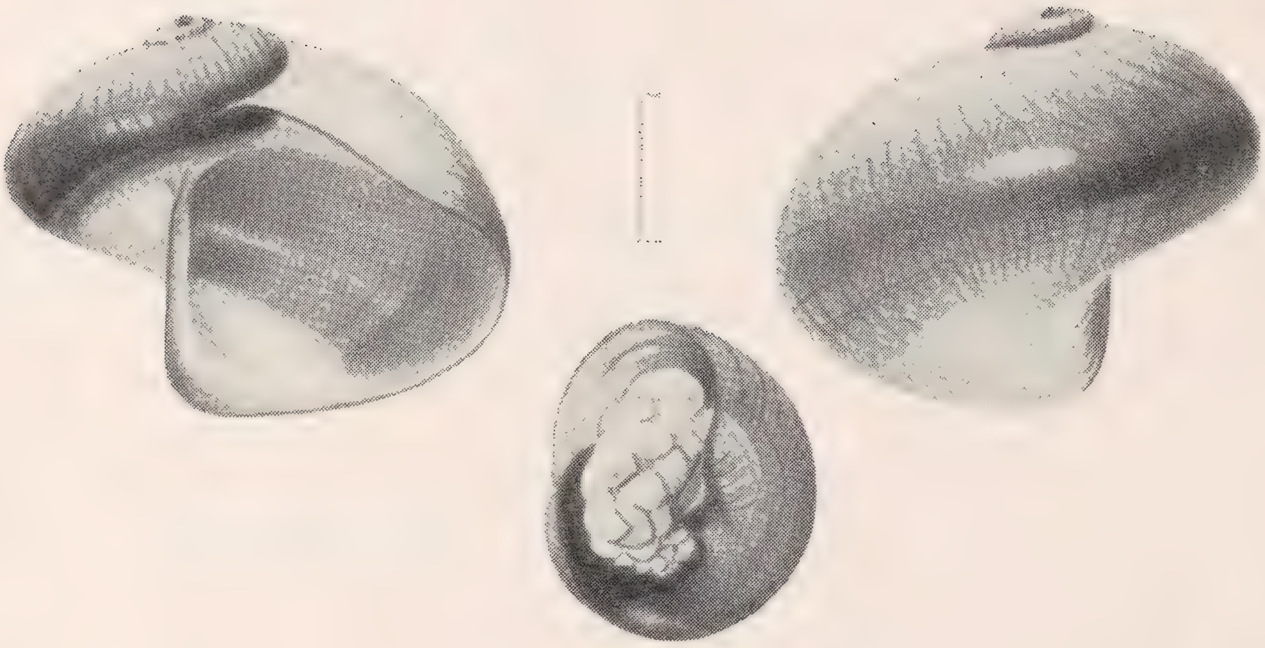
The exact locality is beside a lake covering several acres at Goose Green, about two miles north of the village of South Harting, in West Sussex. The lake is bordered for the whole of its circumference by a broad marshy strip thickly grown with Typha and Sparganium. *V. moulinsiana* must have been present in countless numbers as there was hardly a leaf spike without a shell adhering, and I found one with as many as eighteen attached to it.

As the lake margin must have been four or five hundred yards round, it is hard to estimate the population of the colony. The lake water was hard, being fed by a small stream which appeared to rise from South Harting Down.

L. B. Langmead.

Enemies of Snails.—While doing field work on land mollusca near the valley of the Don, S.W. of Doncaster, Vice County 63, Mr. J. Smith, of Walsall, and I were rooting in the hedge bottom when a field vole ran from under a mound of dead grass which formed its nest. On its removal a large number of empty shells of *Helicella cantiana* (Montagu) were found, the animals of which had been eaten by the voles. We observed that no other kind of shell was found in the nest, although *H. nemoralis*, *H. aspersa*, and *H. hispida* were abundant in the region.

A. S. Cook.



Janthina planispirata. Ad. & Rve.

[*See p.* 186.

THE DAVILA CATALOGUE

By R. Winckworth

Pedro Francisco Davila published his *Catalogue systématique et raisonné des curiosités de la nature et de l'art* in 1767. In the avertissement he says that he had collected for over twenty years and put his collections up for sale because he had to go to Peru for family reasons. Lamy 1929 (*J. Conchyl.* 73, 68) states that the collections were sold in 1768 and that he afterwards made another collection, which was bought by King Charles III of Spain. A pencil note in my copy of the catalogue states that he died in 1786.

The Davila, or de Avila, family takes its name from the town of Ávila in Castile and includes Pedro Arias de Avila, who founded the town of Panama in 1519 and was later succeeded by Cortez, Gil Gonzalez Davila (1517–1658) the antiquary, Agustin Davila y Padilla, the Mexican prelate and historian, and Enrico Caterino Davila, born near Padua, who wrote in Italian a history of the civil wars of France.

Davila mentions his debt to Romé de Lisle for preparing with him the whole of the natural history part. Romé de Lisle certainly prepared the descriptions of the polypiers in volume 1 and the whole of volume 2 (terres, pierres et mineraux), but according to Blainville (Manuel, 323) the descriptions of the shells are certainly the work of the Abbé Duguast, identified by Lamy as the Abbé de Gua de Malves (1712 ?–1786). It is curious that the Linnean system is only mentioned in connection with minerals.

My copy of the catalogue has the prices marked throughout, and also two loose slips in different handwritings giving the totals, one in livres and sols, the other in francs. The franc tournois, recognized as legal standard in 1667, and the livre were used indiscriminately as equivalent sums in the eighteenth century until the name was fixed as franc in 1795. The livre or franc of the French currency was fairly steady from 1720 until 1914 at about 25 francs to the English gold pound.

The 1,007 items of shells fetched 26,933 francs, giving an average price of over £1 a lot. The highest bid was 900 francs (about £36) for the wentletrap *Epitonium scalare* (L.). Twelve other shells reached 200 francs or over: a large polished *Turbo sarmaticus* L., 396; *Voluta vexillum* Gm., 384; *Cucullæa*, 360 and 250; *Placuna sella* (L.), 250; *Oliva angulata* Lam, 245; *Malleus malleus* (L.), 240; *Spondylus multilamellatus* Lam., 240; *Pleurodonte labyrinthus* (Lam.), 200 each, two lots; *Voluta scapha*, Gm., 200 and *Isognomon isognomum* (L.), 200. Among eighteen other species that went for over 100 francs are *Cardium costatum* L. and species of *Ostrea*, *Spondylus*, *Murex* and *Conus*.

The Palmier marin, a *Pentacrinus*, fetched 900 francs, the only very high price in the first volume outside shells. In volume 3 two encrinites went at 380 and 180 and a fossil fish at 400. One envies purchasers of canvas paintings by Alonso Cano and El Greco for 24 and 18 francs. Water colour drawings of shells on vellum did better at 30 to 280. The library is interesting: Lister's *Historiæ Conchyliorum libri iv* fetched 503 francs; the copy is carefully collated with one in the King's Library and the differences of the two printings listed and discussed on pages 231–238. Of other works bearing on conchology one may note Aldrovandus 409, Seba 203, Gualtieri 100, Rumph's *Thesaurus* 15, Adanson 15 and Rondeletius 11 francs. The total of the whole sale is given as 198,709 livres.

TURTON'S EDITION OF LINNE'S SYSTEM.

By R. Winckworth.

Dr. William Turton (1762–1835) when he was nearly forty years old undertook 'a translation from the last edition of the Systema Naturae of Linne, by Gmelin, amended and enlarged by the improvements and additions of later naturalists' with the object of 'adding something to the stock of innocent amusement, and something to general utility' as he observes in the preface to this work. The title is: A GENERAL SYSTEM OF NATURE . . . BY SIR CHARLES LINNÈ: translated from GMELIN . . . BY WILLIAM TURTON, M.D. . . . LONDON . . . 1802.

The work was issued in four volumes in 1802, comprising the animal kingdom. A second issue, in seven volumes in 1806, consists of the same four volumes, unaltered except in the addition of a portrait of Linné and in having new title pages gummed in the place of the excised 1802 title pages, together with three new volumes which contain the vegetable and mineral kingdoms, an account of Linné and an explanation of terms. I recently acquired a copy of the 1806 edition and I am indebted to Mr. A. S. Kennard for the loan of volume 4 of the 1802 issue. From a careful comparison it is quite clear that the second issue is not a new impression; not only are the errata not corrected, but the same ink blurs and weak letters (which are numerous) occur in both. The work was published in London, but was printed in Swansea, where Turton practised as a doctor: Volume 1 by Voss and Morris 1800, volume 3 by D. Williams 1801 and volume 5 by Z. B. Morris 1803.

The only volume which concerns conchologists is volume 4, which I have checked page by page with Gmelin. The additions to Gmelin are mostly from Pennant 1777, J. Adams 1797 in *Trans. Linn. Soc.* and F. Kanmacher 1798 in G. Adams, *Essays on the Microscope*, edition 2; there are a few from Donovan, two from Shaw and one from Martin 1798. A few Gmelin species have been omitted: these omissions seem to be due to errors of copying. Thus on page 228 *Venus crenata* is left out, but under *V. striata* are included the description of *V. striata* and the references for *V. crenata.* Seven other Gmelin names have similarly vanished in transcription. On the whole Gmelin has been blindly copied and his mistakes usually repeated e.g. *Tellina apelina* (error for *opalina*), *Nautilus spicula* (error for *spirula*); but *Limax lanceolaris* is correctly altered back to *L. lanceolatus.* In addition I have noted 28 slips or misprints in names copied, the most curious of which is the spelling *Phloas* for *Pholas*; the others are all variants of trivial names, such as *Tellina scobitina* for *scobinata* and *Helix nucleata* for *aculeata.*

Among the names of Testacea in Gmelin there are 38 sets of homonyms; these are left unaltered by Turton, except in *Patella* where he has altered the first homonym in all cases. On the other hand he leaves *Tellina rugosa* Born and *T. rugosa* Pennant; on page 358 *Bulla truncata* Gmelin and *B. truncata* J. Adams are left though only one species comes between.

The new names of testacea in this volume are listed below. It is only by checking Turton page by page with Gmelin, that they can be found, as there is no indication that they are new names and no reference is given to Gmelin's earlier name. In the following list the page and name in Turton are given on the left.

194 *Tellina plana* = *T. depressa* Gm. 3238, non Pennant.
270 *Ostrea rufescens* = *O. subrufa* Gm. 3329, non Pennant.
387 *Buccinum minimum* = *B. minutum* Pennant, non J. Adams.
401 *Buccinum laeviusculum* = *B. laeve* Gm. 3488, non J. Adams.
488 *Turbo albulus* = *T. albus* J. Adams, non Pennant ; not *T. albulus* Fabricius 1780.
563 *Patella rugosa* = *P. inaequalis* Gm. 3694, not 3705 nor 3732 ; not *P. rugosa* Röding 1798.
564 *P. explanata* = *P. depressa* Gm. 3694, non Pennant.
567 *P. ovata* = *P. depressa* Gm. 3698, non Pennant.
570 *P. cingulum* = *P. melanozonias* Gm. 3703, not 3733.
571 *P. dentata* = *P. denticulata* Gm. 3703, not 3731.
571 *P. nodosa* = *P. nodulosa* Gm. 3703, not 3732 ; not *P. nodosa* Born.
572 *P. rubida* = *P. sanguinea* Gm. 3705. not 3732.
572 *P. glabra* = *P. inæqualis* Gm. 3705, not 3694 nor 3732.
573 *P. punctata* = *P. punctulata* Gm. 3705, presumably as not Gm. 3717.
575 *P. tenuissima* = *P. tenuis* Gm. 3708, not 3733.
576 *P. imbricata* = *P. antiquata* Gm. 3709 ex Linne, not Gm. 3735.
578 *P. rubicunda* = *P. rubella* Gm. 3712 ex Fabricius, not Gm. 3723.
581 *P. radiata* = *P. jamaicensis* Gm. 3715, not 3730 ; not *P. radiata* Born.
590 *P. rotalis* = *P. rota* Kanmacher, non Gm. 3720.

This array of 19 early forgotten names is not so alarming as it looks. *Patella puncticulata* was twice described by Gmelin (pages 3705, 3717) with the same references, so that Turton's new name is a synonym. Four more names are also synonyms, since the homonym of the earlier author has been renamed. I consider that four other names in which the Gmelin homonym with page precedence have been renamed are also synonyms. Four more names are preoccupied. Only six names remain to be considered as possibly available.

Tellina plana Turton is based on a figure in Gualtieri, which may be *Tellina incarnata* L.

Ostrea rufescens Turton is based on a figure in Lister (180, 17) which is certainly much like *Pecten* figure 97 in *Conchologia Iconica*, said to be *P. fabricii* Philippi, which I doubt.

Patella explanata Turton and *P. ovata* Turton are based on figures I have not been able to examine under present conditions.

P. glabra Turton is based on an unrecognizable reference in Schröter.

P. rotalis is not a mollusc and does not concern us.

A NEW CALIFORNIAN *NEOSIMNIA*

By S. Stillman Berry.

One finds much (quite a bit too much) unsteadiness throughout the scattered literature of West American *Amphiperatidæ.* For a number of years past the writer has therefore been accumulating notes and specimens with a view to a comprehensive illustrative revision of them, but material is hard to come by and although progress is being made it is very slow. I am still in need of further material of nearly all the species, particularly those of the Panamic Region, and am above all desirous of securing examples which still pertain to determinable fragments of the particular gorgonian or other cœlenterate upon which they are characteristically to be found. It is in the hope that these and other specimens may be sent me, thus expediting completion of the final paper, that I offer this advance notice of one of several undescribed forms now in hand.

Some of the kinds are very puzzling and some which seem fairly distinct to us now may conceivably prove to be only geographic races or even mere *situs*-forms of others.

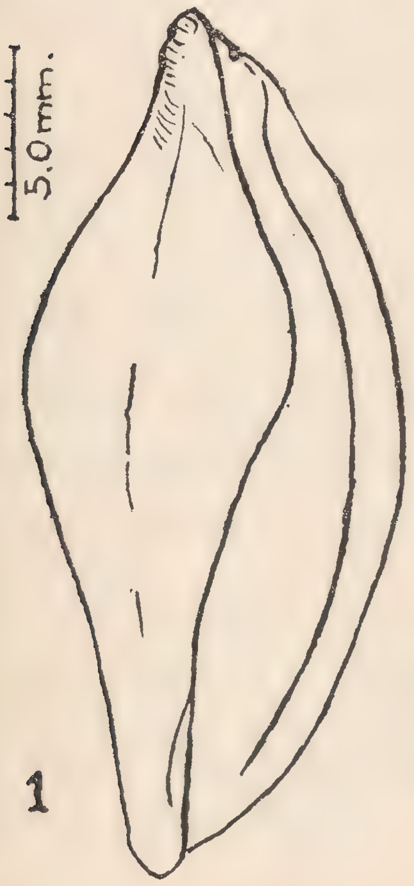
A good many years ago the late C. W. Gripp, a collector at San Diego, California, in reporting an extensive list of Mollusca dredged outside the entrance to the harbour there, included (1909, 135, and footnote): " *Ovula spelta* Lam. . . . Three large specimens at 18 fathoms, new to the Pacific Coast." *Neosimnia spelta* (Linnæus) is a well-known Mediterranean species, the natural occurrence of which in our waters would be altogether unlikely. Gripp's untimely demise and the dispersal of his collection left the manner of identification of his specimens as well as what he actually had in hand a complete mystery. The attempt to run the matter down led over a long trail and into much fruitless inquiry, until at long last and in quite surprising fashion the trail ended near at hand, in my own street to be exact.

Before disposing of the extensive cabinets of shells brought together by Mrs. Matilda Zech, her daughter and my neighbour, Miss Lillian Zech, kindly permitted my examination of the considerable series of *Neosimnia* there represented. Among them proved to be a single shell of Gripp's long-debated find, which she generously contributed to my work. Furthermore the pencilled label accompanying it bore the following note: " only 5 found. 2 Smithsonian, 2 Oldroyd, 1 Zech." Visiting Stanford University shortly thereafter I enlisted the aid of Dr. Myra Keen in searching through the Oldroyd Collection, with consequent prompt recovery of the two specimens noted. Three specimens are thus in hand, accounting for the precise number reported by Gripp as constituting his original series. Where the " 2 Smithsonian " shells are, whether they are the same, whether they constitute a later find, or whether the information on the Zech label to that extent exceeded the reality, I have not learned. The three shells recovered, of course, have nothing whatever to do with *N. spelta*, not even strongly suggesting that species except in a very general way. They quite apparently represent an undescribed species, an account of which follows.

Neosimnia bella-maris new species

Figs. 1–2

Description.—Shell fusiform, thin, translucent, robust, strongly swollen at about two-fifths of the way from the apex, the maximum diameter about 45 to 50 per cent of the altitude. Surface polished and glossy; growth-lines numerous, very fine, sharp, and inconspicuous, crossed by weak microscopic traces of fine spiral striation; otherwise without sculpture except for perhaps seven to nine low, obscure, rather wide spiral cords at the apical extremity and six to eight similar ones descending spirally from the columellar region anteriorly. Shell rather abruptly pointed at both ends, but a little more produced at the apex than basally. Outer lip strongly arcuate, thickened, whitish, medially produced, retracted at both termini; apically abruptly narrowed, emarginate, and notched; anteriorly retreating into the short, weakly reflexed canal, which is slightly exceeded by the tip of the columella. Columella twisted and pinched, its anterior extension arcuate and somewhat bent inward; columellar callus smoothing evenly over the whorl without a definite outer boundary; fossula very steep, moderately excavated and with a low, nearly immersed, inner swelling or hump.



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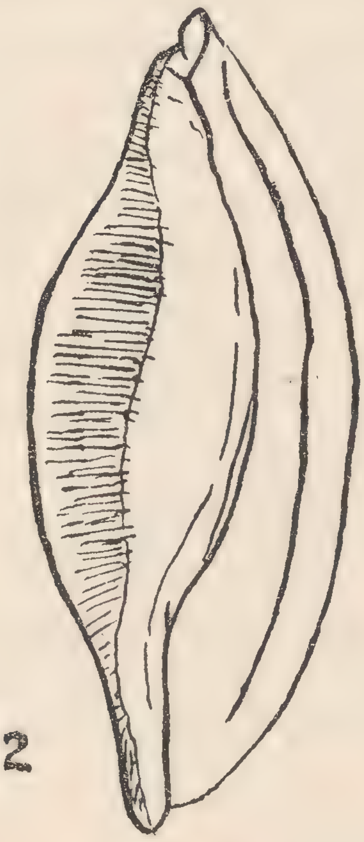

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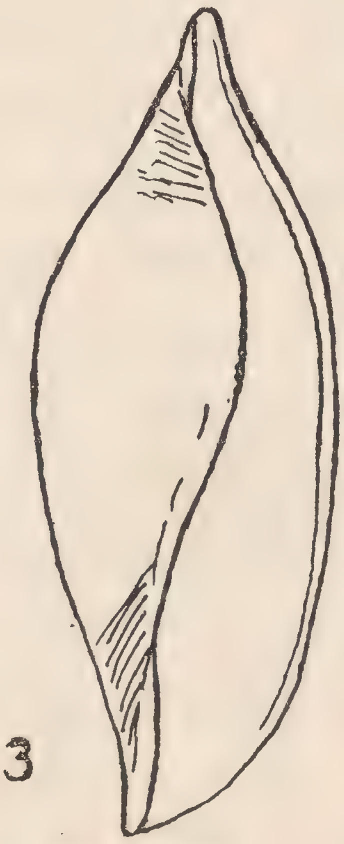

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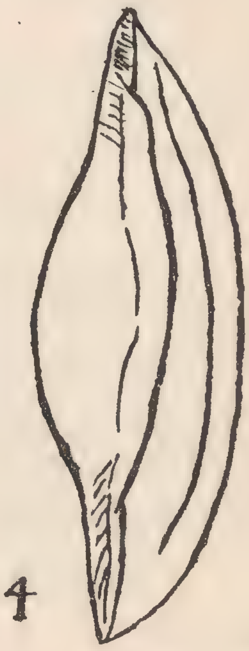

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FIG. 1.—*Neosimnia bella-maris* n.sp. Camera outline of holotype.

FIG. 2.—*Neosimnia vidleri* (Sowerby). Camera sketch of shell from Monterey Bay, California.

FIG. 3.—*Neosimnia catalinensis* (Berry). Camera sketch of holotype from 50 fathoms, off Avalon, California.

FIG. 4.—*Neosimnia barbarensis* (Dall). Camera sketch of shell from off Newport, California.

Colour of body of shell brownish vinaceous with some clouding of deep brownish vinaceous, or dimly banded with two narrow paler bands and three wider ones of the deeper hue, paling abruptly to light buff or light ochraceous salmon in the zone back of the aperture, also paling to light buff terminally where it is barely tipped with mustard yellow.

MEASUREMENTS.

	Holotype.	*Paratype* 10,390.	*Paratype* 792.
	mm.	mm.	mm.
Altitude	24·6	22·0	20·4
Maximum diameter	10·8	9·6	10·0
Diameter of aperture at widest point	4·3	3·5	3·7

Holotype.—Stanford University. Paleo. Type Coll. No. 7846.

Paratypes.—No. 10,390 Berry Collection; No. 792 Museum of Palæontology, Stanford University.

Type-Locality.—Eighteen fathoms, off entrance to San Diego Bay, California; C. W. Gripp, from dredgings, summer, 1908; three known specimens.

Remarks.—Dall (1921, 139) in his final summary of the molluscan fauna of the region attributes six species of *Simnia* and *Neosimnia* to Upper California, all of which are now placed by most students (e.g. Schilder, 1932, 54–5) in the latter genus. Two of the six are West Indian, and more should be required than a mere pronouncement *ex cathedra* to establish them as bona-fide inhabitants of Californian waters. A third, *variabilis* (C. B. Adams 1852), is considered by Schilder, who rather puzzlingly quotes it as of Reeve 1865, to be synonymous with *N. inflexa* (Sowerby 1832), a possibility first suggested by Adams himself. Schilder follows Dall in extending the range of this species to Upper California, yet I am unaware that any really conclusive evidence exists of its occurrence as an actual member of the living assemblage there. The three remaining species, *vidleri* Sowerby 1881, *barbarensis* Dall 1892 (considered by Schilder, 1932, 54, 64, to be a varietal form of *lœbbeckeana* Weinkauff 1881), and *catalinensis* Berry 1916 stand, I believe, as recognizable members of the Californian fauna. The species here described constitutes a fourth in a beautiful group, and is in several respects the finest of them all. From the perhaps allied *barbarensis* the new species differs in its considerably less marked terminal acumination, much greater inflation, heavier shell, thicker lip, and still further obsolescence of most of the apical structures. The last point mentioned and the inflation also distinguish it from *vidleri*, as do the deeper and more recurved posterior outlet, more polished surface, and lack of major spirals on the body of the shell. In form it is rather more like *catalinensis*, but it differs markedly from that in almost every other particular. Schilder (1932, 54, footnote) rather summarily rejects *catalinensis* as based upon a juvenile *barbarensis*, but this dictum does not appear very convincing with the shells themselves in hand. Willett (1937, 398) reports a magnificent example of *catalinensis* which measures, despite its youthful aspect, 32·5 by 12 mm. This is much larger than any *barbarensis* of record, and larger even than any shells seen of the present species. *N. catalinensis* additionally differs from all the other species in its very thin, nearly colourless shell, very slender and sinuous labrum, reduction of the fossula to a very narrow groove, and sharpness and copiousness of the terminal striation. If it be an immature stage of any of them, it would seem more plausible to refer it even to *bella-maris* rather than *barbarensis*, though I see little to convince me that this is the case, while in several particulars, notably in colour, they afford the opposite extremes amongst the four.

The specific name chosen is derived from the L. *bellus*, attractive, charming + *mare*, sea.

Since this article was submitted for publication I have received the "Minutes of the Conchological Club of Southern California", No. 53, for October, 1945. On p. 40 these "Minutes" contain a rescript of some important notes by Schilder on *N. lœbbeckeana* from a paper (Schilder, 1931, 67) as yet unseen by me and not at this time directly accessible. The rescript unfortunately bears internal evidence that it is not free from errors of transcription, but none of them appears sufficient materially to alter the writer's meaning. From these notes it appears that Schilder was able to locate and study the holotype. He found the original figure to be misleading in many particulars and therefore gives a new figure, a tracing of which accompanies the rescript. From this it seems that Schilder's association of *barbarensis* Dall with this species will be difficult to assail, providing (1) that there has been no confusion of specimens, and (2) that *lœbbeckeana*, which is considerably larger, more heavy-lipped, and of more strongly roseate colouring than is usual in our Californian shells of this category, has been correctly assigned to West American waters. On present evidence alone *barbarensis* seems properly relegated to the synonymy, with its standing even as a subspecies open to serious doubt until we can know more of the host-gorgonians and whether there is any question of host-guest specificity involved. In any event to call *barbarensis*, as Schilder does, a deep-water form of *lœbbeckeana* is to strain hard on the facts, *all* Californian species of the genus being characteristically deep-water animals like the cœlenterates upon which they are found. It is not until one approaches tropical waters that one expects to capture them in shore, reef, or shallow-water collecting.

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A COPSE IN THE COTSWOLDS.

By A. E. Salisbury.

(*Presidential Address.*)

After a break, due to war conditions, of some years in a series of visits into Herefordshire, my friend, Mr. J. R. le B. Tomlin, and I renewed these trips again last year and in the early autumn, and as a result of the slight improvement in the petrol situation we were able to make the journey there and back by car ; this not only made travelling more pleasant but allowed of stopping as and when we cared. Such a break was made for lunch as we neared Seven Springs (which is reputed by some to be the source of the Thames—but this is at Thames Head). Our halt was on the commencement of the escarpment which forms the western edge of the Oolitic Limestone of the Cotswold Plateau ; here then we pulled up by a copse which I had visited on several occasions, known as Chatcombe Wood. It verges on to the road at the top of the hill which follows downward by the woodside, giving way to a strip of roughish grass which broadens out towards the hill foot ; the south-west limit of the wood is marked off from the grass by a slight ditch in which grow willow herb and the coarser grasses, giving harbourage to a number of *Trichia striolata* (C. Pfr.) among other species. Entering the lower part of the wood one finds that it is composed of beech and ash chiefly, and a few other trees, amongst them being some planted conifers : these last have no doubt been planted in an otherwise fairly untouched woodland of ancient origin, having a certain amount of undergrowth, somewhat thick in places, with a carpet of *Mercurialis perennis*, in other places with a considerable area of bare soil.

Time being our own we were induced to spend a while exploring further and searching for snails. It was soon evident that *Helix pomatia* L. probably still occurred, as several recently dead shells were found. *Cepæa nemoralis* (L.) was frequent as was *C. hortensis* (Müll.) both of large size. *Clausilia* was noted, and presently one of us (J. R. le B. T.) reported a single *Ena montana* (Drap.), confirming a remark made earlier that it looked a likely spot for the species ; this specimen was from beneath a piece of paper, and soon afterwards from under an old piece of rotting sacking I produced a second example. Further careful search that day failed to add any more, although *Ena obscura* (Müll.) was about in plenty. Time was now getting on, and as we wished to complete our journey before dark we resolved to make our return via this wood. This day's search in any case had confirmed our hopes that we might add another locality to the list of those where *montana* is known to occur. Strange as it may seem, this was the first time that either of us had taken *montana* alive in Great Britain.

At the end of our stay in the adjoining county we returned by this same spot, arriving in good time at our hunting ground. The weather during the week had been very wet and we had high hopes that this would have induced *montana* and other species to sally forth and put in a more frequent appearance. This proved to be the case, both *Ena montana* and *obscura* being found climbing up the trunks of the young trees ; it seemed that there was a preference for trees with the smoother bark by both of these species, but they were not entirely averse to travelling up the rougher trunks, including the conifers. We were interested to note to what height the snails crawled, and several were observed well above one's head, and possibly the weather continuing wet the snails would go up still higher. Not only these two species but also *Clausilia rugosa* and *Marpessa laminata* were aspirants to height ; these two were frequent, besides a sprinkling of Helicids of the smaller sort.

Of *Clausilia rugosa* a tendency to run to a distinctly small form was noted, whilst *laminata* appeared to be of normal growth. *Cepæa nemoralis* and *Arianta arbustorum* were both larger than usual.

After working the wood in various directions one came to the conclusion that the molluscan population was at its highest towards the lower and western side, where moisture was greatest (in fact the earth was extremely soggy in places on this side) and the shade was the greatest. Here were found large examples of *Limax maximus* (L.) with *Arion ater* (L.) and *Milax sowerbyi* (Fér.) not considered a woodland species generally.

As regards locality it may be noted that it forms another in the chain of four given by the late Prof. Boycott [1] as places where *Ena montana* is to be found in Gloucestershire, so that, if for nothing else, it is worth recording. The four places mentioned by Boycott are as follows, with the ref. numbers used by him in his paper. The most north-easterly (11) is in an old part of Worcestershire, now Gloucester, 3 miles N.W. of Moreton-in-the-Marsh N.E. (this limit is about 17 or 18 miles as the crow flies from this new locality, Chatcombe Wood). The next of Boycott's recorded localities going S.W. and number (12) is Charlton Abbots approximately 6 miles N.E. of the new place then going S.W. one reaches Boycott's no. (13) at Birdlip, *montana* occurring thence onwards at several places on towards Painswick (14), of Boycott, so that this locality forms another link in this chain across Gloucestershire running N.E. by N. to S.W. by S.

This Chatcombe Wood locality seems to contradict Boycott's suggestion that *montana* may prefer dry habitats, this new one being distinctly damp ; his remark that it has no specific connection with beech is confirmed, and it would appear that calcareous soil and ancient woodland are the only necessary features. Certain it is that in Chatcombe Wood it does not particularly mind what tree it is on.

Neither *Clausilia rolphii* nor *Helicodonta obvoluta* was found, both, as Boycott remarks, "woodland species," nor on either visit was a single living *Helix pomatia* seen.

By the kindness of Col. Peile we have microscope preparations made by him from examples from Chatcombe Wood of the radula and jaw of *montana* together with similar preparations of *obscura* for comparison.

The following species were observed, the names in the list being those as used in Ellis' *British Snails* : *Arion ater* (L.), *Limax maximus* L., *Agriolimax lævis* (Müll.), *Agriolimax agrestis* (L.), *Milax sowerbyi* (Fér.), *Limax tenellus* Müll., *Succinea putris* (L.), *Pyramidula rupestris* (Drap.), *Ena montana* (Drap.), *Ena obscura* (Müll.), *Clausilia rugosa* Drap.,

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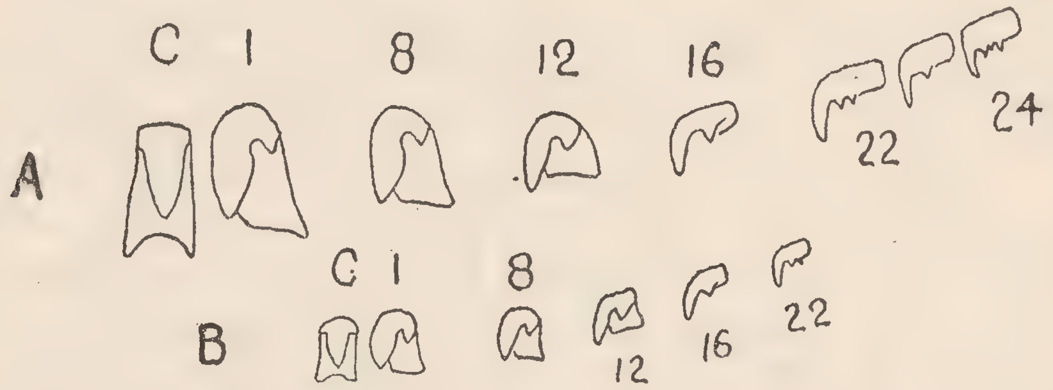
[1] Boycott, this Journal, Vol. 21, pt. 6, p. 156.

Marpessa laminata (Mont.), *Theba cantiana* (Mont.), *Trichia striolata* (C.Pfr.), *Helicella caperata* (Mont.), *Helicigona lapicida* (L.), *Arianta arbustorum* (L.), *Helix pomatia* L., (dead), *Helix aspersa* Müll., *Cepæa nemoralis* (L.), *C. hortensis* (Müll.), *Retinella nitidula* (Drap.), *Oxychilus cellarius* (Müll.), *Zonitoides nitidus* (Müll.).

The above is the result, be it remembered, of only a few hours' work, so that a more prolonged and careful study of the locality would no doubt add considerably to the list above given and draw more attention to the botanical association.

The following notes and drawings of the radulæ of *Ena montana* and *obscura* have been prepared by Lieut.-Col. Peile and kindly contributed as an addition to this paper.

Ena montana.—Averages for five radulæ give the following measurements: length, 2·1 mm.; breadth, ·74 mm.; number of rows of teeth, 90 + nascent, formula 28.1.28. The radula figured has 84 rows, formula 29.1.29, in a length of 2·17 mm. and width ·735 mm. The central tooth has weak ectocones, the laterals and marginals have them well developed, but broken up into two or more cusps or denticles towards the ends of the rows. The outermost lines are rudimentary.



Representative teeth from radulæ of A. *Ena montana* (Drap.), B. *Ena obscura* (Müll.). Magnification approx. × 400 (after reduction to ½).

Ena obscura.—Averages for four radulæ give measurements: length, 1·4 mm.; breadth, ·48 mm.; number of rows, 90 + nascent, formula 24.1.24. The radula figured has 98 rows, formula 25.1.25 in a length of 1·5 mm. and width ·5 mm. The central tooth is wider in proportion to its length than that of *E. montana*, and has rather stronger ectocones. In other respects the radula resembles that of *montana*.

The figured radulæ will be deposited in the British Museum, Natural History.

SOME NEW FOREST SNAILS.

By L. W. Stratton.

The village of Burley, with its satellite hamlet of Burley Street, is situated just four miles, as the crow flies, from Ringwood, though nearly six miles by road. It is a typical New Forest village, and one of the beauty spots of that beautiful region. The people are also typical foresters, and, in spite of electric light and a modern bus service, maintain a feudal outlook on life.

From the conchologist's point of view, it is a particularly interesting area for study, in that it is completely isolated. It occupies an irregularly-shaped depression of good arable land, with a maximum width of one and a quarter miles, surrounded by the grey sandy gravel of the New Forest moorland. To the north-east is Oakley Enclosure, consisting entirely of pines. The rest of the surrounding country is open moorland, dotted with dwarf pines, with a peaty surface covered with heather, and with that creeping form of gorse which, in this district, is so often brightly tinted with dodder. The uplands are bleak and windswept; the hollows threaded by brown peaty streams, which will sometimes yield a few stunted *Lymnæa peregra*; or filled with those treacherous, acid bogs that have swallowed up not a few of the native ponies. This is the home of the sundew, which often grows in great profusion, but of land snails there is none.

The Burley depression has plenty of hedgerow, many scattered oaks and a few ash; a mixed wood to the west on the slopes of Burley Beacon, and, on the eastern rim, some small woods of magnificent beeches. The arable land is partly under cultivation, partly down to pasture, and there is a large area of open pasture known as Burley Lawn.

The molluscan results of some two years' investigations were very meagre, the list of land snails being as follows :—

Goniodiscus rotundatus, *Arion hortensis*, *Arion ater*, *Trichia hispida*, *Trichia striolata*, *Helicigona lapicida*, *Cepæa hortensis*, *Helix aspersa*, *Retinella nitidula*, *Oxychilus alliarium*, *Oxychilus rogersi*, *Oxychilus cellarium*, *Agriolimax reticulatus*, *Limax tenellus*, *Limax arborum*.

Of these, *Cepæa hortensis* was the most abundant. *Helicigona lapicida* was represented by a single live adult specimen from one of the beechwoods, and I saw one *Limax tenellus* on a beech tree one pouring wet day, when there were hundreds of *Limax arborum* about. The other species were fairly widespread and nowhere uncommon.

As we have here an almost perfect example of isolation, it seems worth while to give details of the various forms of *Cepæa hortensis*. In all 112 of these were taken, of which 53 were banded and 59 self-coloured. Juveniles not taken were in the same proportion. Five of the eight shells banded (12345) were taken at various times in the school garden, and a large patch of nettles close by yielded a few banded shells, but the majority were self-colours of olive-brown or lilac. All but four of the banded shells had white lips and ribs, but of the self-coloured shells there were only 12 with white lips and ribs, this including all ten yellows. The banded shells showed the usual variations in the width of the bands, the ground colour being nearer white than yellow. There were 30 orange shells among the self-colours, and these varied a good deal in depth of colour, and, in a number, the colour varied from apex to mouth.

Analysis.

Banded Shells.

12345	25.	Bands varied in width.
	3.	Bands 3 and 4 fused at mouth.
	1.	Bands 2 and 3 fused at mouth.
	1.	All bands fused at mouth.
	1.	Ground colour tinged pink. All white lips and ribs.
123(45)	1.	White lip and rib.
(12)345	2.	White lips and ribs.
	1.	Pink lip, white rib.
1(23)45	1.	White lip and rib. Bands fused at mouth.
	1.	Pink lip, white rib.
1(23)(45)	1.	White lip and rib.
(12)3(45)	2.	Pink lips, white ribs.
(12)(34)5	1.	White lip and rib, Bands fused at mouth.
(123)(45)	1.	White lip and rib.
(12345)	8.	White lips and ribs.
	1.	White lip and rib. Banding lilac.
12045	1.	White lip and rib. Band 3 showed slightly at mouth.
12345	1.	White lip and rib. Var. *arenicola*.
Total	53	

Self-coloured Shells.

Yellow	10.	All white lips and ribs.
Orange	2.	White lips and ribs.
	16.	Pink lips, whitish ribs.
	6.	Brown lips, pink ribs.
	6.	Brown lips and ribs.
Orange-fawn	3.	Lip-self, rib-white.
Fawn	1.	Lip-pinkish, rib-white.
Fawnish-brown	4.	Lips-pinkish, ribs-white.
Brown	4.	Brown lips and ribs.
Orange-brown	2.	Brown lips, pink ribs.
Lilac	3.	Lip-self, rib-white.
	1.	Lip-self, rib-pink.
	1.	Lip-brown, rib-lilac.
	1.	Lip-self, rib-pink. Pale bands radiating from the apex.
Total	59	

The fresh-water species were even fewer in number, the list being: *Lymnæa truncatula*, *Lymnæa stagnalis*, *Lymnæa peregra*, *Planorbis leucostoma*, *Planorbis albus*, *Anodonta anatina*, *Sphærium lacustre*.

There is only one stream that is never dry, the Ober Water, one of the head waters of the Lymington River. At Burley it has a gravelly or sandy bottom, with weeds, mostly watercress, along the margins. *Lymnæa peregra* was plentiful, though small. There were some *Lymnæa truncatula* and many *Planorbis albus*. I also obtained two specimens of *Anodonta anatina*, both small and very short.

There are three ponds in the depression, and several moorland or semi-moorland ponds round about. I visited them all on several occasions. They are:

1. *Burley Lake*, a large pond of some one and a half acres, in the grounds of Burley Manor. It is surrounded by large beds of the Great Reed Mace, and there is a controlled outlet to the Ober Water. Fine specimens of *Lymnæa peregra*, var. *ovata*, and *Planorbis albus* were abundant.

2. *House's Pond*, a small, shallow pond on the Burley–Christchurch road, was swarming with *Lymnæa stagnalis*. *Sphærium lacustre* was also present in small numbers.

3. *Mr. Doncaster's Pond*, is a small, but deep, ornamental pond in a private garden, about 100 yards from House's Pond, though apparently the two are unconnected. *Lymnæa stagnalis* of fine size, and medium *Lymnæa peregra* were present in large numbers, but I was informed that the original stock was imported. There was no evidence of snails from either pond straying to the other.

Three ponds lie beside the Burley–Brockenhurst Road. The first,

4. *Broad Oak*, is quite dry in the summer and contains no snails.

5. *Durmast* is never quite dry. It is very weedy, and in spring the whole surface is a seething mass of tadpoles. It yielded a few each of *Planorbis leucostoma* and *Lymnæa truncatula*.

6. *Holman's Pond*, another weedy pond, lies on the edge of the moorland. It was thickly populated with *Lymnæa stagnalis*, and also contained *Planorbis leucostoma*. The peculiar erosion of *stagnalis* in this and House's Pond has provided material for a paper yet to be published.

Two other ponds lie on the moors to the south-west of Burley. They are:—

7. *Long Pond*, a fairly large pond of only a foot in depth, with a hard gravelly bottom and plenty of weed. After a long search with a dipper, I took two small *Lymnæa peregra*. This pond is infested with enormous leeches.

8. *Wooton Pond*, several acres in extent, is a matted mass of weeds, is shallow, and feeds the Avon Water, which also runs into the Lymington River. It contained no molluscs at all, and its main feature of interest was a pair of curlews nesting close by.

The only noteworthy feature of these lists is the discovery of the single *lapicida*; protracted search in suitable weather failed to reveal any more. Though found in a beech wood, it is a most unlikely snail to come across in the New Forest, which is notoriously poor in molluscan life. There are many fine beechwoods, containing trees unrivalled in England, and I have searched a number, always with meagre results. The usual finds were *Goniodiscus rotundatus* in plenty, though small, and some *Oxychilus alliarium*, but seldom anything else. The nearest locality I have for *lapicida* is on chalk at Whitsbury, at least fifteen miles away, beyond Fordingbridge, and there it is scarce.

THE INHERITANCE OF THE KEEL IN *POTAMOPYRGUS JENKINSI* (SMITH).

By T. Warwick.

(Originally published in "Nature" 23rd Dec., 1944.)

The keel, when present in the aquatic and parthenogenetic mollusc, *Potamopyrgus jenkinsi* (Smith) can exist in many degrees of strength. It may vary from the faintest of lines on the shell to a well-marked spinous keel, this latter being the aculeate variety of Overton.

Robson[1] found that colonies may be all smooth, all keeled, or the two forms may co-exist. The keeled forms may persist for years in the same locality, though the proportion keeled may vary from year to year, sometimes dwindling to zero. Boycott,[2] who also worked on this character, found strongly keeled (aculeate) colonies rather rare. Juvenile keeled snails from the field, grown to adult size in the laboratory, were indistinguishable from wild-grown adults. He also found many grades of development in the keel, and the occasional occurrence in nature of the discontinuous development of the character when the keel fades off to give a smooth body whorl.

Both Robson and Boycott bred keeled snails in the laboratory. Robson, using keeled snails and fresh water of different chemical compositions and brackish water, obtained only perfectly smooth offspring. Boycott, using aculeate snails from a fresh water colony near Criccieth, obtained some keeled snails (mostly faintly keeled). However, conditions did not permit any definite conclusions to be drawn about possible causative conditions, except that keeled offspring more often appeared in the bad conditions of open-air aquaria or in cultures kept in rusty tins. In recent years similar experiments have been repeated, and in fresh water the few positive results have, like Boycott's, been inconclusive.

In 1943 a locality was found near Christchurch, Hants, where smooth snails live in a small fresh water stream and aculeate snails in the brackish water stretch of the same stream. These aculeate snails, bred in jars with brackish water of salinity ·175 per cent, and algal-covered pebbles from their native brackish stream (called keel-inducing conditions below) yielded 100 per cent aculeate offspring. Under similar conditions keeled and smooth snails, kept together in the same jar, yielded both keeled and smooth offspring. These experiments have been successfully repeated and amplified this year, and some of the main results are summarized, pending opportunities for carrying out more precise work.

A glass jar was immersed in the brackish stream at Christchurch for the second half of April, 1944. This jar, filled with stream water and using keeled snails as parents, yielded both smooth ahd keeled offspring. A precisely similar experiment, using a jar immersed for part of May gave only smooth F1. A jar set up with keel-inducing conditions and three snails—one perfectly smooth and the other two with barely perceptible keels—yielded an F1 of smooth snails and snails with a well-developed keel. Under similar conditions ten smooth snails from a 100 per cent smooth colony yielded only smooth offspring. Experiments were also made by keeping snails, offspring of keeled parents, under keel-inducing conditions for varying periods for the first part of their lives and then transferring them to smooth-inducing conditions. A batch thus kept for the first 28–35 days of their lives before transference to smooth-inducing conditions yielded seven individuals, only one of which was keeled. Similarly, of twelve snails kept 35–42 days before transference to smooth-inducing conditions (and which were smooth at transference) eleven developed keels of varying strengths, one remaining smooth. The keel-inducing influence thus seems to act during the first few weeks of life. Snails first showed the keel at the age of about seven weeks. Though the discontinuous development of the keel has not yet been produced in the laboratory, its natural occurrence, at least on one occasion, seems to be due to accidental change of conditions from keel-inducing to smooth-inducing.

---

[1] Robson, G. C., *Brit. J. Exp. Biol.*, 3, 149 (1926).
[2] Boycott, A. E., *Proc. Mal. Soc.*, 18, 230 (1929).

From the above experiments it appears that *P. jenkinsi* exists as both keeled and smooth genotypes. Further, since brackish water *per se* does not induce a keel, it seems that the environmental factor responsible for the appearance of the keel is algal. Moreover, this agency needs only to act in early life to induce a keel for the rest of the life of the snail. The alga probably acts partly in a quantitative manner to produce keels of strengths varying from a hardly perceptible ridge to the fully aculeate form.

As already stated, the offspring obtained from jars immersed during April and May at Christchurch were a mixture of keeled and smooth and smooth respectively. These results may throw some light on the many negative results previously obtained in experiments on the inheritance of the keel. It appears likely that, especially in fresh water, the keel-inducing species of alga may have a relatively short life under the laboratory conditions tried hitherto. Jars with a healthy growth of brackish water algæ from Christchurch on pebbles yielded 100 per cent keeled offspring from keeled parents. In the above two jars, however, the algæ only remained healthy for a short time, most of it later forming a flocculent precipitate. The keeled snails in the April jar were older (larger) than the smooth snails. This may be significant as suggesting that the older snails were in the labile condition for keel production at a time when the keel-inducing alga was still alive in sufficient quantity in the culture. It is to be expected that some smooth colonies will prove on breeding analysis to contain a proportion of genotypically keeled specimens.

I am indebted to Miss C. H. Popham, of Christchurch, for helping in the collection of field material, and to Mr. Moffatt, of Hambleden, for facilities in housing experiments.

DISTRIBUTION OF *ERINNA* (*OMIA*) *JAPONICA* (PRESTON)

By W. S. S. van Benthem Jutting (Zoölogisch Museum, Amsterdam).

In his *Handbuch der systematischen Weichtierkunde*, vol. i, part 2, 1931, p. 477, Thiele mentions the following details relating to the genus *Erinna* and more especially to the section *Omia*: "Sectio *Omia* Annandale and Prashad 1919. Schale glatt, Spindelrand breit, flach, eine Scheidewand bildend, sein Rand mit dem Mundrande zusammenhängend. *E.* (*O.*) *japonica* (Preston) in Japan und Sumatra."

Now it occurred to me that the species *Erinna* (*Omia*) *japonica* (Preston) is absolutely unknown in Sumatra. Evidently there must have slipped in a mistake and I tried to trace its origin.

Annandale & Prashad, when creating their new genus *Omia* (*J. As. Soc. Bengal*, N.S., vol. 14, 1919, pp. 460 ff.) for Preston's *Lithotis japonica* from Lake Biwa, Japan, described shell and animal, and discussed—without coming to a final decision—whether *Lymnæa brevispira* Martens, 1897, from Lake Manindjau, Sumatra, might also be classified as an *Omia*. After summing up the taxonomic characters of their new genus the two authors end thus: "Type species. *Lithotis japonica*, Preston, from Lake Biwa in Japan. Known geographical range: Main island of Japan; Sumatra."

This was the pitfall which became fatal to Thiele. Instead of applying the expression "Main Island of Japan; Sumatra" to the genus *Omia*, Thiele understood that it was the geographical range of the species *O. japonica*. When comparing the actual paper of Annandale & Prashad, however, it is evident that this species is recorded from Japan only.

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L. E. ADAMS (1854-1945).

By The Editor.

Lionel Ernest Adams was born in Gower Street, W.C., on 22nd September, 1854. His father, Ernest Adams, was a master at University College, and his mother Margaret was a daughter of Thomas Brettingham, of Brockdish Hall, Norfolk.

His father was a brother of Henry and Arthur Adams, whose names are so well known in conchological literature.

When Lionel was about nine the family moved to Manchester where his father had bought a large boarding school in Queen's Park. Many of the boys came from the Continent, and Lionel, who had entered the school, sometimes went to stay with schoolfellows in Germany, Holland, and Turkey, and developed a passion for travelling which never left him. At 18 he entered the Telegraph Service in Egypt, but after two years he came home to study medicine and become a ship's doctor, and took the London B.A. at Owens College. Finding that the medical course would delay his chance of going on voyages for so long he took a mastership at his father's school and subsequently at schools at Stafford, Penistone, and elsewhere, being thus able to devote the holidays to travel.

Sometimes this took the form of long walking tours at home, during which the mollusca and small rodents were his favourite objects of study. He joined this Society in 1885, having in the previous year published *The Collector's Manual of British Land and Freshwater Shells*, with 9 plates, 1 to 8 being coloured : there is also an issue with all plates plain. The figures were all drawn by his brother Gerald W. Adams. In 1896 a second edition appeared, considerably enlarged, with an additional plate 10 of Pisidia—issued coloured and plain as before, and containing the Census of Authenticated Records of Distribution. In 1902 he published the Census in this *Journal*, vol. 10, pp. 217–237, and was president of the Society, 1898–9.

He contributed papers on various branches to most journals which dealt with natural history, such as the *Field*, *Wild Life*, and our own *Journal*, and in gathering data walked round the whole coast of England.

In 1923 he married Amy Margaret Sherwin, of Stafford. He spent the latter part of his life in the Isle of Wight, and died at Newport at the age of 90 on 20th September, 1945.

He presented his collection to this Society at the beginning of the war.

ROBERT ALBERT PHILLIPS (1866-1945).

By A. W. Stelfox.

To the younger members of the Society even the name of R. A. Phillips may scarcely be known, as his last note was read on 11th May, 1935, and appeared in the *Journal* the following August (vol. 20, pp. 142–5). In this short paper Phillips announced his discovery of living specimens of *Vertigo genesii* Gredler in several localities in the Irish midlands. Phillips was a magnificent collector and possessed a remarkably critical eye, as the above discovery of *Vertigo genesii* and of *Milax gracilis* (*Journal of Conchology*, 19, p. 65) amply indicate. His discovery of living specimens of this Vertigo was perhaps his greatest triumph, but he also added *Paludestrina confusa*, *Pisidium supinum* (fossil), and *Pisidium moitessierianum* to the Irish list. His critical judgment was of much help to the late Charles Oldham and the writer when making a special study of the *Pisidia* between 1913 and 1920 and, whatever success we may have had in this work, Phillips must be given a large share of the credit. Most of his conchological writing will be found in *The Irish Naturalist*, or in the *Journal of Conchology*, and a full obituary has appeared in *The Irish Naturalists' Journal* for July, 1946.

Although firstly and mainly a botanist, Phillips was always willing to collect anything for anybody, and hence his name figures largely in the series of faunal and floral reports published by the Royal Irish Academy during the last forty-five years. Son of a County Cork schoolmaster, R. A. Phillips was born at Courtmacsherry, Co. Cork, on 29th April, 1866, and he died at Cork on 20th November, 1945. At the age of 14 he entered the employment of Messrs. Guy and Co., Stationers, Cork, and for some forty years he was one of their chief travellers : he remained with this firm for the rest of his life. Phillips may be described as a genial, but quiet, gentleman, very popular with all who knew him ; he had a great flair for natural history and had he been given the opportunity would have made a great reputation for himself as a biologist. In 1901 he was guilty of turning loose English specimens of *Theba cantiana* at Tivoli, Cork—an act which he subsequently regretted—where a colony flourished for some years on the railway line near the (now demolished) station, and may still be there.

GEORGE COOPER SPENCE.

By Dr. J. W. Jackson.

The Society has suffered a grievous loss in the death of G. C. Spence on 1st May, 1945. He was in his 70th year. His wife predeceased him. His two sons are both serving in H.M. Forces.

Mr. Spence was a keen conchologist and joined the Society in 1907, and served on the Council as a Vice-President for many years. He was also a member of the Malacological Society, which he joined in 1920. In addition, he was a member of the Lancashire and Cheshire Fauna Committee, and the Altrincham and District Natural History and Literary Society, being President of the latter from 1943–5.

He specialized in African Land and Fresh Water Mollusca, receiving large collections from friends in pre-war days. He contributed several papers on these to the *Journal.*

His interest in the African mollusca began about 1920 when I handed over to him a collection sent to me from the Belgian Congo by Mr. F. M. Dyke (collected in 1918–19). Later he received further consignments direct. Another group in which he was interested was *Cylindrella*, of which he described a number of species.

After the death of Edward Collier Mr. Spence was instrumental in securing for the Altrincham Museum two fine cabinets of Land and Fresh Water Mollusca, the foreign section of which he boxed and named.

Following his wife's death and the cessation of supplies from Africa during the war, he gave up his house at Sale and went to live in a private hotel, where he took up other studies.

He gave his African collection to the Manchester Museum and his books on African mollusca to the Conchological Society.

Among side-lines after retiring from an insurance business in Manchester he studied clay-pipes and the history of pipe-making in Lancashire and Cheshire; old (metal) Fire Insurance signs on old buildings; and old shop-signs, such as Pestle and Mortar for Chemists, Nigger's Head for Tobacconists, etc. These hobbies took him to many parts of the country. An important paper by him on old tobacco-pipes and their makers in Cheshire, illustrated by his own drawings, was published by the Lancashire and Cheshire Antiquarian Society in 1944. Another on Lancashire clay-pipes is still in manuscript form.

Spence also collected postage stamps, especially African.

On reading my book, *Shells as Evidence of the Migrations of Early Culture* (1917), he became quite enthusiastic about the subject, and gathered together an interesting collection of shells used as currency.

Papers by G. C. Spence.

"Milax gagates at Eccles," *Journ. Conch.*, 1909, p. 45.

"On the Dart of Helix undata Lowe," ibid., 1910, p. 210, text-fig.

"Note on Helix pomatia," ibid., 1911, p. 178.

"Note on Urocoptis lata C. B. Ad. var. Producta C. B. Ad.," ibid., 1912, p. 12, text-fig.

"Scalariform Helix asparsa," ibid., 1912, p. 311.

" Note on Urocoptis rosea Pfr.," ibid., 1914, p. 159.
" On a supposed new species of Limicolaria," ibid., 1915, pp. 127–8, text-fig.
" Note on Cœlocentrum gigas Mts.," ibid., 1916, p. 128.
" Note on Urocoptidæ," ibid., 1916, p. 12.
" Brachypodella oropouchensis nov. sp. from Trinidad, W.I.," ibid., 1919, p. 42, plate.
" Tropidophora standeni nov. sp. from Madagascar," ibid., 1919, p. 43, plate.
" Note on the Reproduction of Obeliscus obeliscus (Moricand)," 1919, p. 67.
" Brachypodella nidicosta nov. sp. from Venezuela," ibid., 1920, p. 86, plate.
" On Obeliscus (Protobeliscus) riparius (Pfr.)," ibid., 1921, p. 135, fig.
" A Collection of Mollusca from the Belgian Congo," ibid., 1922, p. 265.
" Mollusca from the Belgian Congo (II)," ibid., 1923, pp. 19–21, pl. 1.
" Mollusca from the Belgian Congo (III)," ibid., 1924, p. 118.
" On a Collection of Mollusca from the Cameroons," ibid., 1925, pp. 248–250, text-figs.
" Mollusca from the Belgian Congo (IV)," ibid., 1926, pp. 46–9.
" Note on Achatina fulica Fér.," ibid., 1926, p. 53.
" Brachypodella (Gyraxis) emerita nov. sp.," ibid., 1927, p. 136, fig.
" Non-Marine Mollusca from West Africa," ibid., 1928, p. 211, plate.
" Marine Mollusca from a Raised Beach in Cornwall," ibid., 1929, p. 317.
" Notes on a Moonstone from Venezuela," ibid., 1932, p. 191, fig.
" On the sub-genus Apoma Beck," ibid., 1933, p. 286.
" Notes on Potadoma graptoconus P. & B.," ibid., 1937, p. 340.
" Helix pisana Müller," ibid., 1938, p. 72.
" Limicolaria as a pest," ibid., 1938, p. 72.
" How do Land Operculates reproduce ? " ibid., 1939, p. 184.
" Note on Urocoptis olssoni Pils.," ibid., 1940, p. 189, fig.
" Urocoptis dubia Chitty," ibid., 1944, p. 93.

The following types are in his collection at Manchester :—

Ptychotrema (*Parennea*) *dykeiana* Spence = *Parennea connollyi* D. & P.
**Ennea collieri* M. & P. = *Gulella infans* (Craven).
Achatina schweinfurthi Mts., var. *semifusca* Spence.
Limicolaria abinsiensis and var. *aurea*, Shackl. & Spence.
Pseudoglessula (*Ischnoglessula*) *pulchella* Spence.
Homorus (*Subulona*) *bumbænsis* Spence.
Pseudopeas opobœnsis Spence.
Ceras texistriatum Spence.
Succinea catena = *Aillya catena* (Spence).
Cleopatra dupuisi = *Melanoides dupuisi* (Spence).
Thiara (*Melanoides*) *dykei* = *Potadoma dykei* (Spence).
Potadoma nyongensis Spence.
Urocoptis (*Paracallonia*) *corpulenta* Spence.
,, (*Tomelasmus*) *semicolorata* Spence.
Brachypodella nidicostata Spence.
,, *oropouchensis* Spence.
,, (*Gyraxis*) *emerita* Spence.
Tropidophora standeni Spence.

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* It has been stated that the types of *collieri* are in B.M., but as M. and P. described it from two specimens in Ed Collier's collection and as Collier gave Spence these two shells I can hardly see how the B.M. have the types.

EROSION OF *LYMNÆA STAGNALIS.*

By L. W. Stratton.

Early in 1942 I was told that some large black snails were to be found in a pond at Burley in the New Forest. I visited the pond on 11th May, and found it teeming with *Lymnæa stagnalis*. The pond, known locally as House's Pond, is beside the Burley–Christchurch Road. It is roughly oval in shape, about 25 feet by 16 feet. The broad end is overshadowed by a large oak, dead leaves of which choke that end. In the middle of the pond is a large patch of weed, chiefly Water Crowfoot (*Ranunculus aquatilis*) ; the narrow end is clear water, about a foot deep, with a bottom of deep yellow clay. Behind it the ground rises steeply to Burley Beacon and the heathy moorland of the Forest.

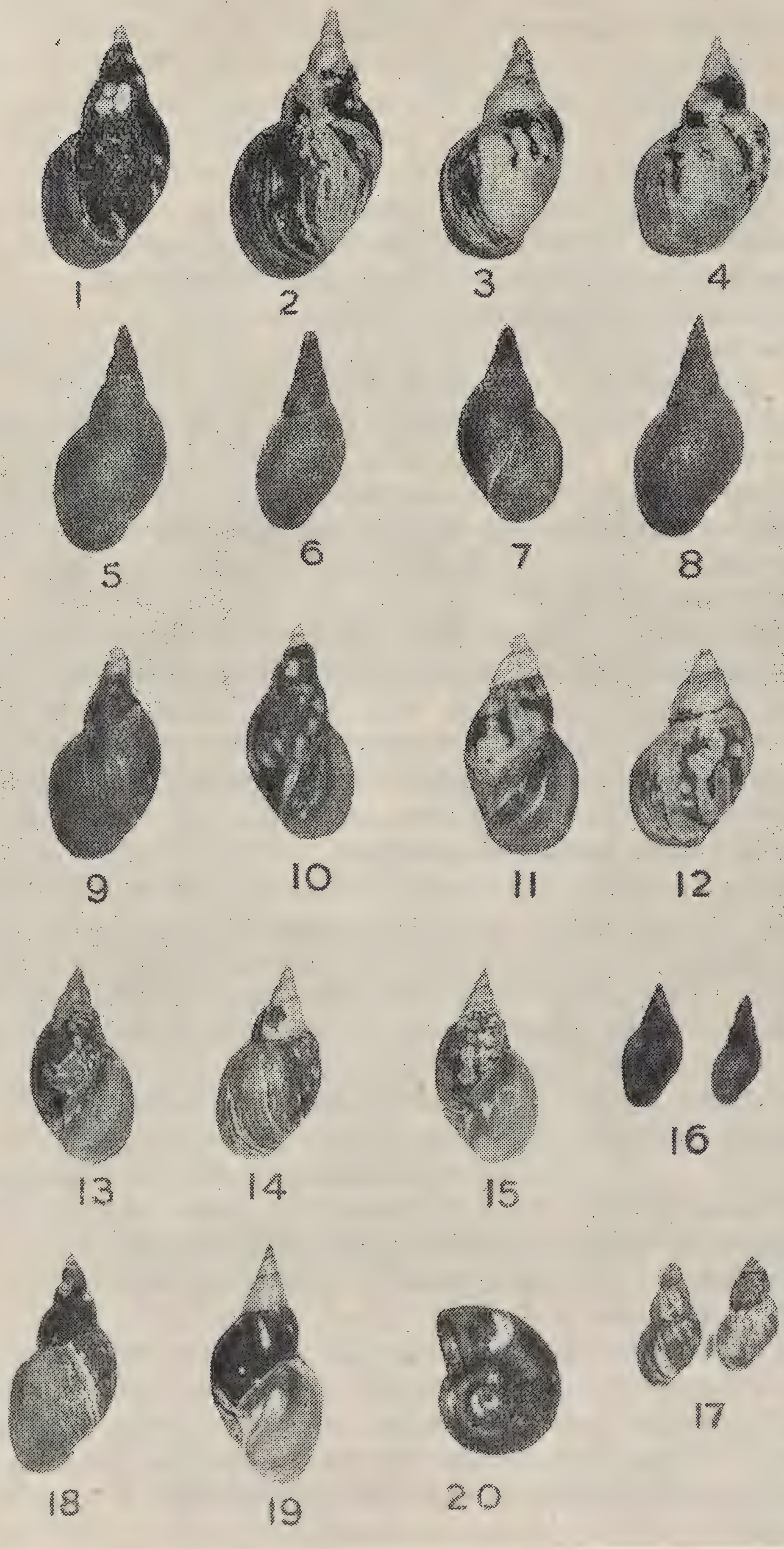
In the open part of the pond *Lymnæa stagnalis* were crawling on the bottom and at the surface, often two or three together. I counted over a hundred in less than a square yard. The snails were also numerous among the weeds ; a few were crawling on dead oak leaves in the sunshine, but there was none in the shadow of the tree. On taking two or three from the water, I found them curiously eroded. I collected sixty snails from various parts of the pond, all within hand-reach of the edge. On careful examination I found that (*a*) the larger snails were more eroded than the smaller ones ; (*b*) erosion in all cases began on the spire, in the form of circular spots ; (*c*) some of the erosion was in the form of lines about a millimetre wide ; (*d*) of the sixty shells, two were eroded only at the tip of the spire, twenty were eroded on the spire only, four had the spire completely eroded, twenty-nine showed erosion on spire and body whorl, while one shell had lost almost the whole of the periostracum ; (*e*) eleven shells had distinct ridges along the line of new growth.

Shells taken with a dipper from the centre of the pond showed similar conditions.

Analysis of the water showed a pH of 6·7 and carbon dioxide ·005 per cent weight in volume. Acidity was not enough to cause the erosion. The bunching of the snails continued throughout the year, and it was obvious that the marks were made by the radula of one snail on the shell of the other.

The only other mollusc in the pond was *Musculium lacustre*. Smooth newts and tadpoles of the common frog were abundant, and there were also dragon fly larvæ and small water beetles.

On 2nd June, 1942, I visited Holman's Pond, on the Burley–Brockenhurst Road, about half-way to Wilverley Post, and here again found *Lymnæa stagnalis* in large numbers. The pond, roughly circular, about 50 feet in diameter, is situated on the edge of Wilverley Plain, peaty heathland with a subsoil of grey sandy gravel, known in Hampshire as Scione. It has a thick growth of weed, mostly Hornwort (*Ceratophyllum demersum*). The shells of this pond were amber coloured, more fragile, and generally less tumid than those of House's Pond. A few showed slight erosion at the extreme tips of the spires.



1–4. *Lymnæa stagnalis*, House's Pond, Burley, Hants.
5–8. *Lymnæa stagnalis*, Holman's Pond, Burley, Hants, 1942.
9–12. *Lymnæa stagnalis*, Holman's Pond, Burley, Hants, 1943.
13–15. *Lymnæa stagnalis*, Pond near Wimborne, Dorset.
16. *Lymnæa stagnalis*, Juveniles, Wimborne Pond.
17. *Lymnæa palustris*, Wimborne Pond.
18, 19. *Lymnæa stagnalis*, Pond, Wall Hall, Aldenham, Herts.
20. *Planorbis corneus*, var. *rubra*, Apostle's Pool, Chipperfield, Herts.

Just a year later, on 29th May, 1943, I visited Holman's Pond again, and found *stagnalis* even more plentiful, but on this occasion the shells were eroded in exactly the same way as those of House's Pond. The general shape of the shells had changed, having become slightly more tumid. They were also decidedly darker, though not so dark as those of the other pond. With the aid of a dipper I took 52 snails, of which seven shells, all small, had a few spots on the spires; nineteen shells were a good deal eroded on the spire, but showed nothing on the body whorl; twenty-four were eroded, in varying degrees, both on spire and body whorl; and two had little periostracum left.

The shells were generally symmetrical, only one showing a slight ridge on the line of growth, and one slight distortion at the mouth.

The pond was a favourite breeding place for frogs, and small black leeches were common. On one occasion I caught a bright yellow tadpole, which, unfortunately, escaped. Other molluscs were *Planorbis leucostoma* and *Lymnæa truncatula*, though neither was abundant.

A similar pond, Durmast, halfway between Burley and Holman's Pond, yielded only *Planorbis leucostoma.*

On 5th August, 1943, while returning from Badbury Rings, Dorset, I found a small roadside pond on the Blandford–Wimborne Road. It was situated at the top of a hill, with fertile, cultivated land around. Irregular in shape, shallow, with cart tracks going through it, the weed growing plentifully was the Broad-leaved Pondweed (*Potamogeton natans*). *Lymnæa stagnalis* was present in large numbers, both adult and juvenile. The adults, amber in colour, were small, seemed worn, and a number showed erosion, as in the other cases. Of twenty-four taken, fifteen were symmetrical, and nine showed varying degrees of distortion. The juveniles, blackish in colour, averaging 12 mm. by 6 mm., showed neither erosion nor distortion. *Lymnæa palustris* was equally plentiful, and the shells of these snails showed even greater erosion than the *stagnalis*, some having lost the tips of their spires altogether.

In 1944 I came to live in Hertfordshire, and found *stagnalis* fairly common in the district. Snails in Elstree Reservoir, the River Colne, the River Gade at Watford, and in a large body of water known as The Fish Pond, at Wall Hall, Aldenham, all appeared normal, though showing slight variations. However, on 20th March, 1945, I found snails of this species in a small pond at Wall Hall, showing the familiar markings.

The pond is a rough square, varying with the seasons from 25 to 35 feet across, and is situated in a corner of a field down to permanent pasture. There is a small wood on the south-east side, so that the pond is in shadow for a part of each day. It is shallow, there is a good deal of grass growing in the margins, giving place further out to the Curled Pondweed (*Potamogeton crispus*).

In March only about one shell in ten was eroded, and that mostly on the spire, but by July very few shells showed no erosion, and on many there was a good deal. Other molluscs were *Lymnæa peregra* and *Planorbis albus*. Frog spawn was plentiful in March, and in July two specimens of the Water Scorpion (*Nepa cinerea*) were taken with snails.

Recently, I discussed the matter with Dr. F. W. Jane, of University College, London, and he suggested that the snails might be feeding on algæ growing on the shells. This seemed not unlikely, since pond snails "feed on the decayed remains of water plants and especially on Algæ which they scrape off the leaves of plants, the mud, stones, and other surfaces" (Boycott, "The Habitats of Fresh-water Mollusca," *Journal of Animal Ecology*, 1936). "Other surfaces" could be shells, so I submitted to Dr. Jane for examination snail shells from each pond. He found algæ, often abundant, on all of them. The principal alga was some member of the *Chætophoraceæ*, allied to *Gongrosira*, if not *Gongrosira* itself. This alga is described as "constituting a dense cushion-like mass, frequently incrusted with carbonate of lime, and sometimes forms quite a hard stratum" ("British Freshwater Algæ," West and Fritch, 1927).

The following points of similarity, both in habitats and shells, may be noted : (*a*) all the ponds were small and closed ; (*b*) all were partially shadowed by trees ; (*c*) all had plenty of weed ; (*d*) there is evidence that the waters were somewhat acid ; (*e*) all the ponds were thickly populated with snails ; (*f*) all the shells showed a growth of algæ ; (*g*) all tended to be small, and, in some cases, thinner than usual.

I think (*b*) can be dismissed as irrelevant, since the shading was not sufficient to effect either the weed growth or the snail population, but the others are all related in one way or another to the two questions which may arise concerning the cause or causes of the erosion. They are (1) Did the snails feed on the algæ because of shortage of food, due either to the natural conditions of the ponds or to overcrowding ? (2) did they feed on the algæ, and incidentally on the outer layers of the shell, in order to obtain calcium lacking in the water ?

Or is the explanation much more simple and prosaic ? Perhaps *Gongrosira* is a particular delicacy among pond snails.

In order to try and find some evidence to support either of the above theories I took five samples of normal *stagnalis* from various localities, for comparison with the five eroded samples.

The localities were : Sample 1—A running pond in the Parks, Southampton. Sample 2—A small, but deep ornamental pond in a garden at Burley, near House's Pond. Sample 3—A ditch connected with the River Avon at Ringwood. Sample 4—A slow, running stream feeding the Avon at Kingston, near Ringwood. Sample 5—The Fish Pond at Wall Hall, Aldenham, Herts.

The eroded samples were : Sample 6—House's Pond, Burley, Hants. Sample 7—Holman's Pond, Burley, 1942. Sample 8—Holman's Pond, 1943. Sample 9—Roadside Pond, near Wimborne, Dorset. Sample 10—Small pond, Wall Hall, Aldenham.

I measured, weighed, and found the volumes of all ten samples, some 120 shells in all. From these figures I obtained the weights per cubic centimetre, giving the relative weights, bulk for bulk, and these I reduced to percentages, giving the heaviest shells 100 per cent. The following table shows the results.

	Av. Length. mm.	*Av. Width.* mm.	*Av. Vol.* c.c.	*Av. Weight.* gr.	*Av. per c.c.* gr.	%
NORMAL SAMPLES						
1.	41·88	23·14	3·52	·916	·260	99·6
2.	41·75	21·75	3·60	·594	·165	63·2
3.	39·20	21·00	3·40	·759	·223	85·4
4.	38·20	22·00	3·90	·843	·261	100·0
5.	42·33	22·83	4·08	·773	·189	72·4
ERODED SAMPLES						
6.	33·20	19·33	2·86	·567	·198	75·8
7.	29·26	15·80	1·49	·144	·097	37·2
8.	28·55	16·55	1·66	·318	·191	73·2
9.	26·45	15·13	1·47	·316	·215	82·3
10.	32·00	16·96	2·03	·406	·200	76·6

The figures, at first sight, seem to support the shortage of food theory. It seems reasonable to assume that the *size* of the shell depends largely on body growth, and growth on food supply. The normal samples were all much bigger than the eroded samples, suggesting bigger and better food supplies, which seems not unlikely in larger or moving bodies of water, providing other factors were favourable. *Stagnalis* from Elstree Reservoir, 59 acres, are comparable in size and weight with my eroded shells; they show very little growth of algæ and no erosion, but the water of the reservoir is never clear and the weed growth is poor, so that bad lighting and a possible shortage of food seem to be likely factors in limiting growth here. Boycott, in the paper previously quoted, says, " Some species, generally *Lymnæa stagnalis* or *L. peregra* sometimes occur in such profusion in a small locus that it seems hardly credible that there can be enough room and food for many other species." This is particularly applicable to all my *stagnalis* ponds, seven and ten yielding two other species each, the others only one. This overcrowding would also restrict food supplies for the *stagnalis* themselves.

There is a good deal to be said, however, for the calcium theory. The comparative weights per c.c. should also give the relative thickness of shell, which, in turn, should give some indication of the calcium content of the water, since thickness of shell is dependent on the calcium available for shell building. Boycott, again in the same paper, has a good deal to say on the influence of lime on freshwater mollusca. He includes *stagnalis* among thirty species which are " calciphile or calcicole in that they are habitually found in hard water, and there is evidence that ordinarily they need water with at least 20 mg. of calcium per litre, and some of them more ".

Let us, therefore, consider the waters from which our ten samples were taken. Sample 1 came from a running pond fed from the town water supply, which, in Southampton, is notoriously hard, coming as it does from the chalk downs near Winchester, and frequently coming from the tap milk-white. Sample 2, with fine, large shells, but a weight of only ·165 gr. per c.c., is from a small closed pond, again fed from the main, but the New Forest water supply is very different from Southampton's. Here we have the suggestion of an ample food supply, but shortage of calcium. Sample 3 was from a ditch regularly flooded by the River Avon, which has 85 mg. of calcium per litre at Salisbury, twenty miles away, and probably more at Ringwood, since " the water tends to take more salts in solution and become harder the further it goes " (see W. H. Pearsall, *Proc. Roy. Soc.*, B, 92: 259). The stream for sample 4 is often " lost " in the winter floods of the lower Avon, and running water tends to be harder than stagnant. Sample 5 is from the Fish Pond, which is connected by drains with the River Colne, and has given, at various times, 89–100 mg. per litre. When the sample was taken, however, there had been two dry summers and a dry winter, little or no water link with the Colne, and the pond so low that more than half its bed exposed dry. Dead *Anodonta cygnea* and *A. anatina* lay about in hundreds. It would seem that a good food supply was there, but a steadily diminishing supply of calcium.

Samples 6 to 10 were all from small, closed ponds. An analysis of 83 closed ponds in Aldenham (including Sample 10) showed variations from 16 to 85 mg. per litre, average 48. I have not the actual figure for 10 itself. Unfortunately I had not realized the significance of lime content when I was in Hampshire, so that the only figure I can give is a *p*H of 6·7 for Sample 6, suggesting a low figure for lime. Samples 7 and 8 were probably in worse case, as the pond was fed by surface water of the peaty New Forest moors. The indications are that the eroded samples lived in water less, possibly a good deal, less alkaline than the normal samples.

The general conclusion so far seems to be that the small size of the eroded shells may be due to overcrowding and thereby shortage of food, and the lightness of the shells due to lack of calcium.

Which of these deficiencies did *Gongrosira* make up ? Holman's Pond may supply the answer. While the 1943 shells were only very slightly larger than those of 1942, the gross weight and weight per c.c. was more than double. This increase corresponded with a great increase in the growth of algæ, and in the radular erosion. There was no apparent change in the natural conditions of the pond, so that a possible, even probable, inference is that calcium, rather than nutriment, was obtained from the *Gongrosira*, and further calcium from the eroded shells.

In the autumn of 1945 I set up an aquarium with water from Pond 10, plentifully supplied with weed, with a number of half-grown *stagnalis* from the same pond. Some of the snails died during the winter, but two survived until July, 1946. They had grown quite a lot, and both showed the radular markings. A number of *Lymnæa peregra* in the same tank were similarly marked. There were many young *stagnalis*, bred from the originals. I have separated some into a tank with a higher calcium content, and await results with interest. My experience in this connection bears out to a degree that of H. Crowther (*Naturalist*, 1879, p. 42), who kept *stagnalis* in a tank of very soft water. Describing their activities he said, " the animals take a delight in eating the shells of their associates until in some cases the habitation is eaten right through and the animal dies."

Shrubsole, in the *Journal of Conchology*, vol. v, describes in detail the erosion of *Planorbis corneus* taken from the Trent Canal at Stone, Staffs, and kept in water from the River Dee, with a much lower calcium content. The form taken by the erosion, especially in the earlier stages, " circular pits and holes," corresponds exactly with the *stagnalis* erosion, as does the fact that new shell growth was at first unaffected. He does not mention any evidence of radular action, but puts down the erosion to the action of carbonic acid upon the shells, coupled with a lack of calcium in the water.

Among a number of red-bodied *Planorbis corneus* (var. *rubra*) taken in 1945 from the Apostle's Pool, Chipperfield, W. Herts, five showed the same " circular pits " which I have come to associate with radular erosion. This pond, described in the *Journal of Conchology*, vol. xxii, p. 172, is similar in many respects to those described above.

In conclusion an analogy may be drawn between these eroded pond snails and some land snails. Boycott in " The Habitats of Land Mollusca in Britain " (*Journal of Ecology*, vol. xxii, 1934), is emphatic about the necessity of lime for land mollusca and its influence on their distribution, giving only *Zonitoides excavatus* as definitely calcifuge. This passage from the paper is particularly relevant to the problem in hand : " Clench (*Nautilus*, vol. xlvi, 14, 1930) has seen *Helix nemoralis* rasping away the shells of their dead fellows in an American locus poor in lime as I have seen *Helix rotundata* do in a *Zonitoides excavatus* place."

I am indebted to Mr. B. Verdcourt for the excellent photographs, which bring out very clearly the erosion described. For the benefit of photographers of snails he gives me the following photographic details.

Lighting : Two parallel 60 watt sausage bulbs. Plate : Kodak 0·250. Exposure : 15 seconds.

The figures are 0·82 natural size.

Physa fontinalis and *Bithynia tentaculata* in " closed " ponds.—One would not expect to find either *Physa fontinalis* or *Bithynia tentaculata* in stagnant water, but both species occur in such a habitat in the Wirral peninsula, Cheshire, though only rarely. *Physa* lives abundantly in the shallow water at the edge of a large marl-pit close to the Four Lane Ends, Raby, accompanied by *Lymnæa peregra*, *L. palustris*, *Planorbis albus*, and *Sphærium corneum*. *Anodonta cygnea* lives in the deeper part of the same pit, but may have been introduced as glochidia on fish, for the pit is used extensively by anglers.

Bithynia tentaculata was found in great abundance in a small rather shallow pool on Bidston golf-links, October, 1942. Four shallow ditches radiate from the pond to drain off surplus water from the links to the pond, but are, I think, dry for most of the year. There is no connection with the Birket, nor any other running water.

Boycott (*Journ. Anim. Ecology*, v, 167, 1936) mentions similar occurrences in marl-pits elsewhere.

N. F. McMillan.

INDOARTEMON SUBGEN. NOV. FOR ODONTARTEMON KOBELT, 1905 (non Pfeiffer, 1856); STREPTAXIDÆ.

By Dr. L. FORCART, Museum of Natural History, Basle (Switzerland).

BAKER, 1928, p. 127, has pointed out that Kobelt, 1880, p. 209, designated *Helix distorta* Jonas, 1843, as lecto-genotype of *Odontartemon* Pfeiffer, 1856. So this genus replaces *Lamelliger* Ancey, 1884 (Holo-genotype design.: *Helix troberti* Petit, 1841), as has been shown by Bequaert & Clench, 1936, p. 273.

Kobelt, 1905, p. 91, had designated *Streptaxis eburneus* Pfeiffer, 1861, as lecto-genotype of *Odontartemon.* This species was not included in the original description of *Odontartemon* Pfeiffer, 1856, but most modern authors used *Odontartemon* in the sense of Kobelt, 1905. Thiele, 1931, p. 730, divided *Odontartemon* Kobelt (non Pfeiffer) into five subgenera :—

Haploptychius Kobelt, 1905. Holo-genotype design.: *Streptaxis sinensis* Gould, 1859.

Odontartemon s.str. Genotype: *Streptaxis eburneus* Pfeiffer, 1861.

Oophana Ancey, 1884. Lecto-genotype: *Ennea bulbulus* Morelet, 1862. Type selection: Kobelt, 1905, p. 101.

Perrottetia Kobelt, 1905. Holo-genotype design.: *Streptaxis perrotteti* (Petit) = *Helix peroteti* Petit, 1841.

Stremmatopsis Mabille, 1887. Holo-genotype monotyp.: *Stremmatopsis poirieri* Mabille, 1887.

Oophana Ancey, 1884, as the oldest name, replaces *Odontartemon* Kobelt (non Pfeiffer) as generic name.

To replace the subgeneric name *Odontartemon* Kobelt (non Pfeiffer) I propose *Indoartemon* subgen. nov. with *Oophana* (*Indoartemon*) *eburnea* (Pfeiffer, 1861) as genotype.

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PATELLA VULGATA L: RELATION OF HABIT TO FORM.

By A. Comfort, M.A., M.B.

The following observations were made in 1945 at Folkestone. The shore at this point consists of a steep bank of medium shingle, below which rocky shoals are exposed at normal tides, and an almost continuous line of rocks at spring tides, the intervals between spurs being filled with boulders and broken concrete lying upon fine sand and mud. The muddy areas contain large beds of mussels of recent origin, for mussels are said to have been scarce before 1939.

The object of the investigation was to establish the ecology of two very distinct forms of *P. vulgata* L. and of an aberrant conical monstrosity, all of which were found in large numbers dead among drift. In spite of the description and naming of a considerable number of varieties of this species, there seems to be little information on record about their distribution and nature. Norman has stated that the height of the shell and the strength of its sculpture tend to be greater in specimens living close to high tide mark, and to decrease in deeper water. On the stretch of beach observed this observation was not confirmed. A more obvious relationship seemed to exist between shell form and the nature of the ground, distinct varieties tending to exist in bands running out from the shore, and corresponding to the patches of rock and of mussel bed.

The molluscs taken on this stretch of beach fell into two well-defined groups. In one of these the shell was typical, being ovate, conical, and strongly ribbed, showing all the commoner colour-variations, green and blue forms predominating. In the other, the striations were fine, seven to eight times as numerous as in the first form, and the apices undamaged and pointed, larger, invariably greenish with paired radial black rays, and more nearly circular in outline. Old shells of this form showed a marked reticular pattern produced by the radial ribs and growth-lines. But the most striking feature of the limpets collected in the area was the prevalence of a semi-monstrous form, closely resembling a *Hipponyx* in outline. Where typical shells are approximately pyramidal, these shells were shaped something like a coalscuttle or a helmet, the aperture much constricted, the apex well to the front of the shell, and the height exaggerated. The empty shell could not be made to stand on a flat surface, for the margin line, seen from the side, was concave, as if the shell had been squeezed anteroposteriorly while soft.

This unusual form made up some 50 per cent of the living examples found between tidemarks, and included a few distorted examples of the strongly ribbed form, but the vast majority of the abnormals were clearly of the second, fine-ribbed type. They were not found in large numbers either in rock pools or among the roots of weed in the laminarian zone, but the dead shells were numerous among the byssi of mussels, and the living examples upon their valves. It was possible to obtain a long series, ranging from the smallest shells to specimens 1 inch in height, all of them adherent to, and eroding the shells of living mussels. The majority of dead valves of mussels showed one or more oval marks due to the foot of this form. It was also noticeable that many of the deformed shells were curved along the margin from front to back, the limpets roosting transversely.

The mussels on this beach suffer heavily from attack by boring molluscs, and an attempt was next made to determine the behaviour of limpets which were either deprived of their perch or too large to continue on a full-sized mussel. Many of the older shells, all adherent to rocks and boulders, showed similar deformation. It was noticeable that while typical forms tend to select a flat surface, atypicals confined themselves to rounded corners of rock, the knob of which in several cases came a full centimetre inside the shell margin, and to pebbles of suitable size. Many of the larger examples on flat surfaces had a constricted shell with a much expanded brim, like a tropical helmet, the beginning of the brim presumably marking migration from mussel to rock. No adequate explanation could be found for the prevalence in the mussel beds of the fine-ribbed form, unless it is that in stonier and rockier parts of the shore the thin form is destroyed by stones. All the limpets adhering to groynes in the stony belt were of the " strong " type.

It seems clear that we have here a deformity due to habit, cutting across a true varietal division. Norman's observations are borne out by the fact that on a steep beach such as this the " fine " forms occur chiefly in the low-lying areas of mussel bed between rock spits, whereas on a uniformly rock beach such as Langerstone Beach, S. Devon, the " fine " forms occur almost always as dead shells, making up a steady percentage of 10–15 of all shells found. It was not possible to determine the relative survival of " strong " and " fine " forms out of water, but it is worth noting that the mussel beds, lying low as they do, are subject even when under water to the flow of numerous shore freshets and springs, so that the relative salinity at low water must be less than that of the rock pools and rock surfaces. The " fine " animals are noticeably more active than the " strong ", and because of their inability to close down on a level surface it was possible to repeat Semper's observation that the power of adhering to rock is not due to the action of the whole foot as a sucker. There was little noticeable decrease in suction until only a third of the foot surface remained opposed to the rock. The deformed shells do not seem any more vulnerable to birds than the normals, even when caught walking, for they adhere as firmly.

It is possible that such causes as pH and salinity changes are responsible for the selection of " strong " and " fine " forms in various littoral bands. There seems on the beach in question to be some biological barrier between adjacent rock spits. Red forms of *Littorina littorea* occur in fairly well-delimited zones running out from the shore, and white forms in others, the two rarely mixing. Further observations on the ecology of these two races of *Patella* might throw further light on the factors which control variation in littoral communities.

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WOODLAND COLONY OF *H. ASPERSA* IN SUSSEX.

By A. Comfort, M.A., M.B.

Woodland colonies of *Helix aspersa*, composed largely of pale individuals and superimposed upon the general sporadic population of the species, have been described frequently. One such colony in Sussex, which I found in April, 1946, was remarkable for its extent and high population, and for the tree climbing habits of the individuals in it.

The colony is in a beech and fir plantation, at the top of the lane which runs north from the Lancing–Arundel road beside Sompting Abbots church, lying on the slope of the Cissbury range of downs and facing south-east. The trees are of considerable age and are regularly planted. The ground under them is open, but thickly covered with ivy. The colony was visited after a period of drought, broken about 72 hours previously by slight rainfall. Inside the wood and on the lane bank among ivy large numbers of mature and half-grown *H. aspersa* were lying about in full view, lately emerged from hibernation. Most of those seen had sealed the shell-mouth with beech leaves. Very large numbers of the snails were hibernating in clusters among beech leaves at the root of the trees and in crevices of stumps. The number of specimens was so large that in many parts of the wood it was impossible to walk without crushing them. Still more remarkable was the fact that hundreds of them had ascended trees, and specimens ranging from the size of a pea to large adults could be seen singly and in groups on the trunks and branches, at heights ranging from 5 to 25 feet, and a few had mounted still higher and could be identified only with glasses. The animals showed no preference for the shadier side of the tree, though climbing was more marked in the more open parts of the wood. Over fifty individuals were counted on a single beech. *Marpessa laminata* was also present, but it could not be seen more than 6 feet from the ground. There was hardly any sign of persecution by birds although thrushes were normally plentiful on the edges of the wood, and dead shells were mostly intact and had apparently died in hibernation.

The members of this colony were well-differentiated from hedgerow forms outside the wood. A very high proportion was of a clear golden-brown with slight banding, though no pure bandless forms were seen. Others showed varying degrees of normal banding, though most were paler and larger than the typical forms, with cleaner shells and in the adults a rather expanded lip. In many the bands, where present, were unpigmented and rather translucent of a greenish colour.

The bodies of the animals were on the whole lighter in colour than in the average garden forms, but the mantle pigmentation bore no clear relationship to the degree of shell-banding.

There was a marked absence of other mollusca, only *M. laminata*, *T. striolata*, and *G. rotundatus* being seen alive. The colony seemed to have definite borders, and where it had not been limited by cultivation the individuality of the shells blended into the typical garden forms rapidly at the edges of the wood.

In view of the recent date of the plantation (less than 150 years, to judge from the size of the trees) it seems likely that the arboreal colony is in the process of differentiation from the normal *aspersa* population, and it will be interesting to take consecutive samples in the future, to see whether selection of the pale forms occurs, and at what rate. It is also remarkable that the trees selected for climbing included a good many conifers, which Helices usually seem to avoid. Perhaps the steepness of the ground and the invasion of the wood by ivy, in which *H. aspersa* shelters readily, determined the site of this colony. Tree-climbing by this species is fairly frequent, but rarely on the scale seen here, and the immaturity of many of the climbers suggests that their performance was unrelated to pairing.[1]

The sample brought home from this locality was not a true random selection, and the percentage of bandless or unicolorous forms could not be calculated with accuracy, but measurement of the shells themselves showed a distinct tendency for the bandless forms to be (*a*) smaller, and (*b*) rather taller and narrower than typical garden forms and than the darker specimens and the examples of var. *flammea* from the same station, many of which were very inflated and flat. Apart from this slight conchometric difference there was little to differentiate the extreme colour-variants, and tree-climbing was not confined to either colour. The ground colour of the bandless forms was, however, quite definitely divisible into yellow and reddish when the dried shell was examined from within by transmitted light. All the forms with translucent bands were yellow in their ground-colour. Four living adults of this form were kept for breeding, and eggs hatching upon 28th June, 1946, produced a brood of totally white infant *aspersa*, with very glossy unpigmented shells, and bodies in which the only visible pigment was in the eyes. These will no doubt darken somewhat with age—in the meantime they are being investigated from the biochemical standpoint.

It looks rather as though the possible factors in a population of this kind are ground colour yellow/not yellow, shell banded/unbanded, bands pigmented/unpigmented. Of the specimens taken, yellowness did not exclude pigmented banding, though banded pigmented yellows were almost all 1 2 (3) 0 0 forms, but not-yellow, while frequently not-banded, save for a pale zone below 3, excluded banding unpigmented. The groups of mantle cells corresponding to the bands must occur in both yellow and brown-banded forms : in yellows they may or may not secrete pigmented shell—in browns, where present, they always secrete. If we call the factor producing yellowness *y*, and that producing brownness *b*, the normals are *y* plus *b* forms, and the presence of *b*, while it is not essential to the production of pigmented bands, always seems to guarantee the presence of the enzyme or substrate necessary to produce band pigment. It may be possible in the albino brood to find out if this process involves tyrosinase, but I can find no record that the pigmentary material of such bands is in fact melanin. According to Diver (personal commn.) the albinism factor probably acts by delaying rather than abolishing pigmentation, and most of the purest albinos in this batch were immature. If so, it should be possible to notice chemical changes coinciding with the advent of this delayed pigment production.

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[1] Rimmer, R., *Land and Freshwater Shells*, p. 119.

Limapontia depressa Alder & Hancock in North Wales.—*Limapontia depressa* A. & H. is not a common opisthobranch, and has not been recorded from North Wales, so that I was pleased to find it in abundance in a Flintshire salt-marsh by the River Dee recently. The isolated piece of salt-marsh on which the animals occurred lies on the left bank of the river, about a quarter to half a mile below the Queensferry bridge, which links the Wirral peninsula, Cheshire, to North Wales. The river has been canalized, and the low-lying land protected by embankments and reclaimed. It is now good pasture. At the particular place in which we are interested a tidal creek runs inland, culverted for about 40 feet under the inner embankment (which is about 15 feet high). Once inside the embankment it enters a typical salt-marsh, quite isolated, and looking very odd in the midst of pastures. The marsh is roughly square, about 25 yards each way, and surrounded by the remains of a hedge of tall old hawthorns. The upper part of the tidal creek wanders diagonally across it, and much of the marsh is waterlogged. About half the surface of the marsh is mud, with much *Vaucheria* sp. on it, and the drier parts bear a flora of *Aster Tripolium*, and a grass (*Festuca* sp. ? *ovina*) : *Apium* sp. occurs on the banks of the creek as well as an *Atriplex*. The alga *Vaucheria* sp. also occurs as a carpet underneath the Fescue, and it was in this habitat that *Limapontia depressa* was found abundantly on 25th August of this year (1946). Both the usual dark form and the green-and-yellow variety *pellucida* Kevan (*Journ. Conch.*, xx, 16–24, 1934) occurred on the *Vaucheria*, but not elsewhere in the marsh, although carefully searched for. Specimens up to 5 mm. long (when extended) were frequent, but no spawn was seen, and specimens kept in captivity for a week did not spawn. No other mollusks were obtained, although the ground looked suitable for *Phytia*, nor any gammarids, but small *Carcinus mænas* were very abundant, all about 5 mm. across the carapace.

N. F. McMillan.

PLANORBIS EXUSTUS DESH. IN JAVA.

By W. S. S. van Benthem Jutting (Zoölogisch Museum, Amsterdam).

In June, 1946, Dr. G. Bras, reservist army surgeon at Batavia (Java), sent me a sample of *Planorbis* shells from sawahs (irrigated rice fields), near Batavia, for identification.

These shells belonged to *Planorbis exustus* Deshayes, a species common in Sumatra, Malaya, Indo-China, Burma, India, and Ceylon, but hitherto unknown in Java.

As it is a rather large species (diam. maj. up to 15 mm.) it is impossible that previous naturalists should have overlooked the snails, if they had been present in the said region. For many years malacologists have been exploring the environs of Batavia, even collecting such minute species as *Gyraulus convexiusculus* (Hutton), but a *Planorbis exustus* has never come to light.

Therefore it must be concluded that the species has been introduced quite recently. From the very beginning of its arrival it has thrived so well in its new surroundings that propagation was directly successful and—assisted by the intercommunicating irrigation system of the rice fields—it has spread rapidly in the country round Batavia.

According to records by Dr. Bras *Planorbis exustus* had already been observed in 1942 near Bronbeek, east of Batavia. In 1946 the species was very abundant in sawahs near Pasar Minggoe, 7 km. south of Batavia.

It is an open question how this infiltration has taken place. Can the displacement of Dutch, or allied, or Japanese forces, or of civil colonists be made responsible for this introduction, either from Sumatra or from Malaya? Or have they been brought along with planting-material, or in containers with young fish? The fact that the animals have been found in Java for the first time in the neighbourhood of a large seaport town is the more proof that introduction took place through human agency.

LYMNÆA BREVISPIRA MARTENS.

By W. S. S. van Benthem Jutting (Zoölogisch Museum, Amsterdam).

Now that I am envisaging the distribution of the genus *Omia* I seize this opportunity for considering the exact position of *Lymnæa brevispira*.

As I have already pointed out [1] Annandale & Prashad suggested that, on close observation, *Lymnæa brevispira* would turn out to belong to their new genus *Omia*. I have before me some good samples of this peculiar Sumatran species, belonging to the Amsterdam Zoological Museum, and am in a position to give some additional particulars on this animal.

The samples originate from:—

Lake Manindjau, 1888, leg. M. Weber (*Ergebn. Reise Nied. Ost Indien*, part iv, 1897, p. 2).

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[1] *Supra*, p. 202.

Outflow of Lake Toba into Asahan River, 28th October, 1920, leg. F. C. van Heurn.

Sampoeran Harimau, North Habinsaran, on wet rock and between moss, 3rd August, 1928, leg. J. C. van der Meer Mohr (van Benthem Jutting, *Miscell. Zool. Sum.*, no. xlii, 1929, p. 1).

Near Ponot Falls, Tangga, North Habinsaran, on wet rock and between moss, 4th August, 1928, leg. J. C. van der Meer Mohr (van Benthem Jutting, loc. cit.).

Besides there are two other references in literature: Mount Bongson (Bullen, *Proc. Mal. Soc.*, vol. 7, 1906, p. 14) and Laut Tawar and Peusang river (van Heurn & Paravicini, *Natuurk. Tijdschr. Ned. Indië*, vol. 82, 1922, p. 30, fig. 7 of plate).

When analysing the taxonomic features of *Omia* and *Lymnæa* Annandale, & Prashad, apart from the complete agreement of mandibulæ and radulæ, found some characteristics sufficiently important to separate the two genera. These features are given here in table-form :—

	Omia.	*Lymnæa.*
1.	Tentacles elongate and cylindrical or subcylindrical.	Tentacles short, trigonal, flattened dorsoventrally.
2.	Mantle not thickened at its lower margin.	Mantle thickened at its lower margin.
3.	Spire distinctly lateral in position.	Spire not placed laterally, but above preceding whorls.
4.	Shape neritiform, columellar fold broad, flattened, and turned slightly inwards, running obliquely across the posterior margin of the aperture and almost forming a septum in the posterior part of the shell.	Shape not neritiform, columella not flattened or septum-like ; columellar fold lymnæiform, thin, slightly twisted longitudinally.
5.	Main axis of aperture practically at right angles to that of spire.	Main axis of aperture not at right angles to that of spire.

Keeping this analysis in view I can fully agree with the authors' opinion that for creating a new genus *Omia* " the differences from the normal type of *Lymnæa* are sufficiently great to justify generic separation ", but I am unable to support their statement : " In these features it (i.e. *Omia*) bears a very close resemblance to the shell of *L. brevispira*, Martens from a lake in Sumatra."

When comparing *Lymnæa brevispira* with the various points of the table the results can be briefly summarized as follows :—

1. The tentacles are trigonal, flattened dorsoventrally.
2. The free mantle edge is thickened.
3. The spire is not distinctly lateral in position, but placed regularly over the natural axis of the shell.
4. Consequently the shape of the shell is not neritiform ; the columella is not flattened or septum-like.
5. The columellar fold is shaped to *Lymnæa*-pattern, thin, slightly twisted longitudinally.
6. The aperture is higher than broad.

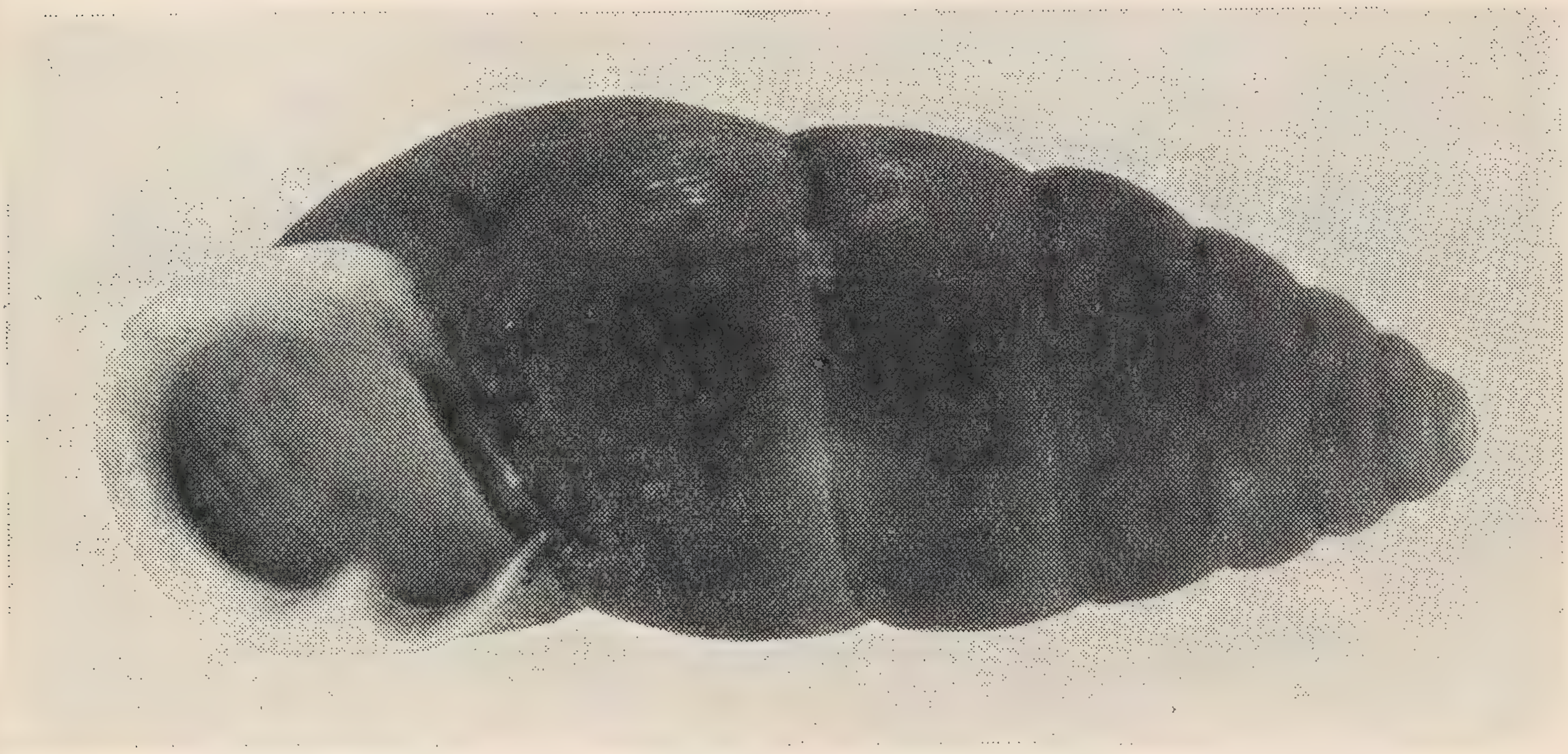
After the preceding analysis the conclusion is easily drawn that *Lymnæa brevispira* Martens from Sumatra is a regular *Lymnæa* and does not—as Annandale & Prashad suggested—belong to the genus *Omia*.

TWO NEW LAND SHELLS FROM ASIA MINOR.

By H. E. J. Biggs.

Ena (*Ena*) *pelidne* sp. nov.

Shell dextral, fairly solid, spindle-shaped, dull, brown-horn coloured, perforate, the umbilicus being partly covered by the peristome ; whorls 7½ to 8, the first two being smooth and shiny and lighter than the remainder which are finely and irregularly striated, moderately convex, gradually enlarging in consistent proportion ; suture not deep ; aperture broadly oval at an angle of 25 degrees to the vertical axis ; peristome interrupted, somewhat thickened and reflected, white, columellar margin more reflected than the parietal, the latter bears a tooth slightly above the middle. In the paratypes this tooth varies from distinct and well developed as in the type to nothing more than a slight thickening at the point where the tooth would be if present ; this condition found in four of the paratypes.



Ena (*Ena*) *pelidne* sp. nov. 13·5 mm. × 5·4.

	Shell.			Mouth.		
	Height. in mm.	*Breadth. in mm.*	*Ratio* $\frac{H.}{B.}$	*Height. in mm.*	*Breadth. in mm.*	*Ratio* $\frac{H.}{B.}$
Type . .	13·5	5·4	2·50	5·1	3·9	1·31
Largest. .	14·4	5·5	2·62	5·1	4·1	1·24
Smallest .	12·3	5·0	2·46	4·4	3·6	1·22
Average .	13·2	5·3	2·50	4·8	3·8	1·26

Habitat.—Near Maçka, Trebizond Province, Asia Minor.

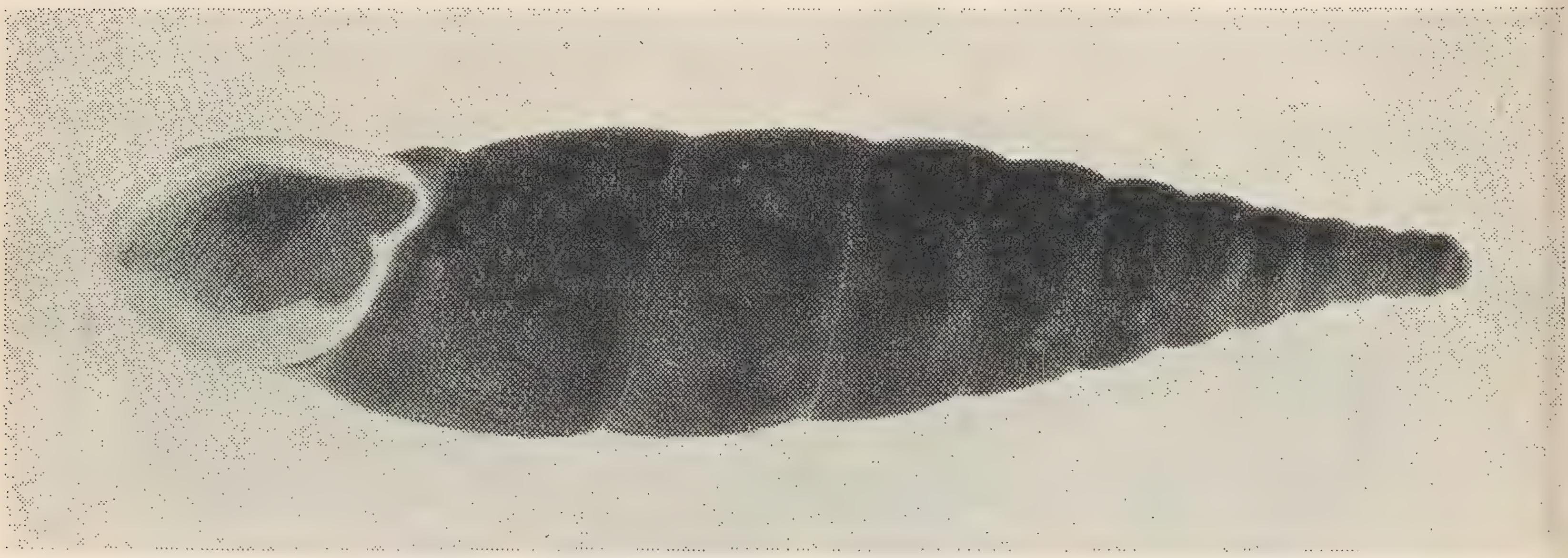
Type and seven paratypes in my collection, two paratypes in British Museum (Nat. Hist.), two in Basle Natural History Museum, and one in Tomlin collection.

The series was collected by Mr. E. K. Balls on 12th June, 1933, while plant hunting in the district. I have submitted the shells to Dr. Lothar

Forcart, of Basle, to whom I am very much indebted, not only for providing photographs of this and the following new species, but also for comparing this species with its nearest relative, *Ena* (*Ena*) *andronakii* (Lindholm) and for other assistance.

Armenica (*Creniclavis*) *mimele* sp. nov.

Shell sinistral, fusiform, reddish-brown, semi-transparent, dull, imperforate; whorls 11½ to 12, protoconch consisting of two whorls more shining though of same colour as rest of shell, whorls with fine, irregular, close costæ tending to become obsolete near the suture, the last whorl bears a strong curved crest; suture shallow; aperture pyriform with narrow and deep channel at base, peristome continuous, free, and somewhat reflected; parietal lamella absent, upper columella lamella not reaching peristome, lower columella lamella s-shaped; on palatal wall opposite basal end of lower columella lamella is a pointed, but not strong fold, lunular fold forked at base and over it four palatal folds.



Armenica (*Creniclavis*) *mimele* sp. nov. 18·6 mm. × 4·2 mm.

	SHELL.			MOUTH.		
	Height.	*Breadth.*	*Ratio* $\frac{H.}{B.}$	*Height.*	*Breadth*	*Ratio* $\frac{H.}{B.}$
Type . .	18·6	4·2	4·43	4·4	3·2	1·38
Largest. .	19·8	4·2	4·71	4·5	3·2	1·41
Smallest .	17·2	4·1	4·20	4·1	3·0	1·37
Average .	18·0	4·2	4·33	4·2	3·0	1·40

Habitat.—Near Maçka, Trebizond Province, Asia Minor.

Type and four paratypes in my collection, one paratype each in British Museum (Nat. Hist.), Basle Natural History Museum and Tomlin collection.

The series was collected by Mr. E. K. Balls on 9th June, 1933. This new species is at once distinguished from its near relative, *euprepes* Biggs by the fact that the costæ are much less strong and less regular. Then again it is broader in proportion to the height and there are four instead of three palatal folds over the lunular fold.

RUDOLPH BERGH.

By Dr. HANS SCHLESCH [1]

BERGH has a worldwide reputation for his work on nudibranchs: yet he was not a professional zoologist, but had a strenuous career in medicine and it is astonishing that he was able to do so much good work in both subjects.

Ludvig Sophus Rudolph Bergh was born in Copenhagen on 15th October, 1824, and died there on 29th July, 1909. He studied medicine at the Almindelig Hospital, where he became Oberarzt in 1863, a post he held for forty years. He specialized in venereal disease, on which he wrote more than fifty papers (1859–1908); nearly all of them published in *Hospitalstidende*, of which he was a co-editor from 1859 to 1865. On Bergh's initiative and proposals a special hospital for the treatment of these cases was built, the Vestre Hospital, afterwards renamed Rudolph Bergh's Hospital, which was a model for similar institutions through Europe.

Bergh began his work on mollusca when nearly thirty years old, probably under the influence of Japetus Steenstrup, with a treatise on Marseniaden, i.e. Lamellariidæ, in Danish (1853). This was followed by a long series of papers on nudibranchs, at first in Danish; but by 1870 he realized that he must use a more widely read language and the rest of his work was written in German, or occasionally in English or French. He divided nudibranchs into Cladohepatica, characterized by the divided and usually branched liver (now the three suborders of Dendronotacea, Arminacea, and Eolidacea), and Holohepatica, in which the liver is a compact mass (now Doridacea). He also separated *Elysia* and its allies as a suborder Ascoglossa (1878), in which he was anticipated by von Jhering, who had called the same group Sacoglossa in 1876. His system of nudibranchs, in which the families and genera are defined and the species listed appeared in part 18 of Malacologische Untersuchungen in Semper's *Reisen im Archipel der Philippinen*: it repeats three papers already published on Cladohepatica (*Zool. Jb.* 1890), cryptobranch Dorids (*Zool. Jb.* 1891) and Porostomata (*Verh. z-b. Ges. Wien*, 1892) with the phanerobranch Dorids added. His contributions to Semper's *Reisen* form volumes 2, 7, and 9, and include material from all parts of the world; of the 2020 pages and 155 plates about three-fifths concerns nudibranchs, while volume 7 treats of pleurobranchs and other tectibranchs. Other important papers are the "Neue Nacktschnecke der Südsee" in *J. Mus. Godeffroy* (1873–9) and reports on the material from the Challenger (1884), Albatross (1894), and Siboga (1905) expeditions. There are about 90 other papers of his on mollusca in various journals: among them a useful account of the radulæ of *Conus* (1896).

Bergh laid the foundations for further study in nudibranchs. His strength lay in his enormous capacity for work, his skill in dissection, his excellent drawings, and in his detailed knowledge of the literature;

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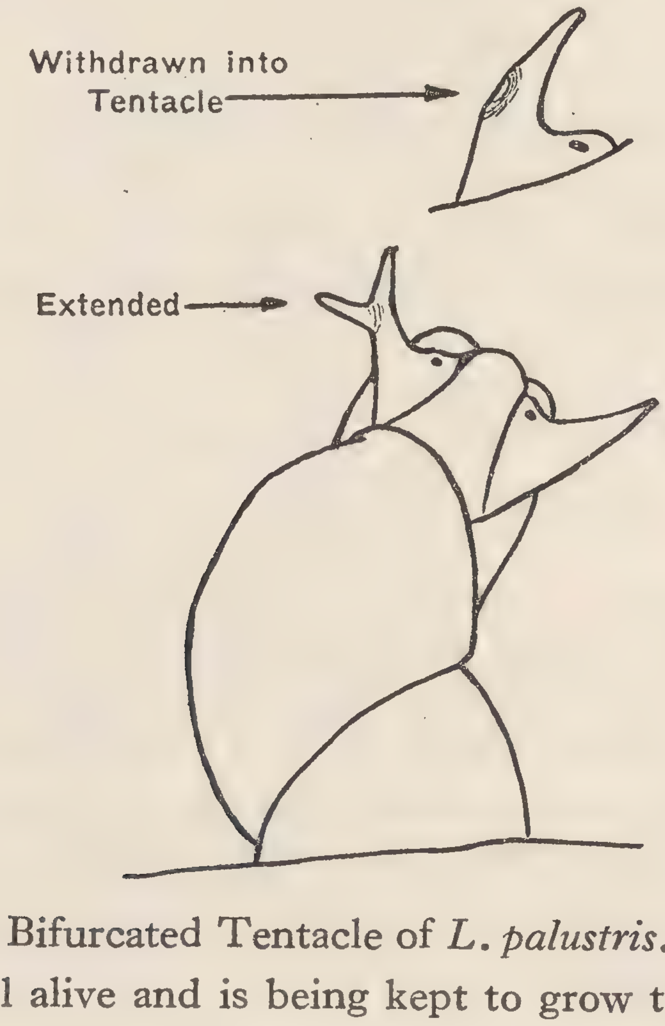
[1] Translated and abridged by R. Winckworth.

his genius is displayed in his System, an immense advance for his time. He rightly stressed the value of the nervous and genital anatomy in systematics, but frequently ignores important diagnostic points. Working on preserved material he was perforce an anatomist rather than a naturalist, though he eagerly sought drawings of and information about the living animals.

Bergh carried on his work to his last years, but heart trouble at last undermined his robust constitution. He received many honours including two Danish decorations (Rider of Dannebrog and Dannebrogsmand) and was elected to foreign membership of many scientific societies. Personally he was charming and kindhearted; always willing to give help on matters medical or molluscan, though sometimes displaying dignity and irony.

Bergh had only one son, Rudolph Sophus (1859–1924), a competent zoologist, who studied at Würzburg and Villefranche and became Dozent in histology and embryology at Copenhagen University and was the author of several textbooks. One of his papers is malacological, Ueber die Gefässwandung der Mollusken (*Anat. Hefte*, 1897). In 1902 he left the university and went to Germany to devote himself to music. He died at Davos.

Abnormal L. palustris (Müller).—While collecting mollusca at a pond in Bentley, Doncaster, Vice-County 63, a number of *L. palustris* were taken for stocking an aquarium. One of these was noted to have a malformed left tentacle, the abnormality appearing as a retractile extra tentacle situated about half-way down the original one (which is not retractile). When fully retracted it was only evident by microscopical examination; when fully extended it would be quite half the length of the normal tentacle.



Bifurcated Tentacle of *L. palustris*.

This specimen is still alive and is being kept to grow to adult size.

A. S. Cook.

TWO YEARS' COLLECTING IN THE READING DISTRICT

By B. Verdcourt

Whilst an undergraduate at Reading University I had little time for Natural History work, but I managed several excursions to near-by places and the results are given here. Particular attention was paid to the Thames at Sonning and Bottom Wood, Mapledurham. This list has no claims to completeness, since the time expended was very small and only a few of the types of locality available were visited.

Theodoxus fluviatilis (L.). Common in the rocky-bottomed parts of the Thames.

Pomatias elegans (Müller). Abundant, living in Bottom Wood on the loose calcareous slopes : in June found mating in large numbers on tree stumps.

Potamopyrgus jenkinsi (Smith) and var. *carinata* Marshall. Frequent in the Thames : Bradfield.

Bithynia tentaculata (L.). Common.

Bithynia leachii (Shepp.). Frequent in the Thames.

Viviparus viviparus (L.). The commonest snail in the Thames.

Viviparus fasciatus (Müll.). The only place I found this was at Hagley Pool, near Oxford.

Valvata piscinalis Müller. Frequent in the Thames.

Carychium minimum Müller. Common, especially in the "scrub" lining some parts of the Thames.

Lymnæa palustris (Müller). Not common. Among some odd specimens in the Zoological Department of the University I found a peculiar shell which Dr. J. W. Jackson kindly identified as var. *obesa* Taylor. No locality was appended, but I have since been told that it was found in the Reading district.

L. stagnalis (L.). Common.

L. peregra (Müller). Abundant.

L. auricularia (L.). Frequent in the Thames.

Ancylastrum fluviatile (Müller). Common on stones near the bank of the River Thames.

Ancylus lacustris (L.). Frequent on water-plants.

Physa fontinalis (L.). Frequent in the Thames and at Bradfield.

Planorbis corneus (L.), *P. planorbis* (L.), *P. carinatus* Müller, *P. vortex* (L.), *P. albus* (Müller), and *P. contortus* (L.) occur in the Thames. Only *P. vortex* (L.) is abundant.

P. acronicus Fér. One example of this was dredged from the Thames at Sonning.

Succinea putris (L.). Common.

Pupilla muscorum (L.). Bottom Wood and Churn.

Lauria cylindracea (da Costa). This was one of the few molluscs that I found within the grounds of St. Patrick's Hall.

Abida secale (Drap.). Mapledurham.

Vallonia costata (Müller). Churn.

V. excentrica Sterki. Frequent, especially in the scrub at Sonning.

Acanthinula aculeata (Müller). Scarce outside of the Chiltern Hills (as Rev. L. W. Grensted remarks, 1926, Nat. Hist. Oxford Dist. 307). It occurs in Bottom Wood and at St. Patrick's Hall.

Cochlicopa lubrica Müller. Common.

Azeca goodalli (Fér.). Frequent in Bottom Wood.

Ena obscura (Drap.). Frequent in Bottom Wood.

Punctum pygmæum (Drap.). Sonning and St. Patrick's Hall.

Goniodiscus rotundatus (Müller). Common.

Arion ater (L.) var. *simplex* Moq.-Tand. Langridge Wood.

Clausilia bidentata (Ström). Common in Bottom Wood.

Cochlodina laminata (Mont.). Common in Bottom Wood.

Helicella caperata (Mont.). Frequent.

H. virgata (da Costa). Reading.

Monacha cantiana (Mont.). Common.

Trichia hispida (L.) and *T. striolata* (Pfr.). Common.

Ashfordia granulata (Alder). Several on the banks of the River Kennet.

Helicigona lapicida (L.). Caversham Warren.

Cepæa nemoralis (L.) and *C. hortensis* (Müller). Frequent.

Helix aspersa Müller. Common.

Euconulus fulvus (Müller). Sonning and Bottom Wood.

Zonitoides excavatus (Bean). Mortimer Heath (Hants.). Gregarious on freshly cast up shells of *Anodonta anatina* L. at Bearwood.

Z. nitidus (Müller).

Retinella radiatula (Alder). Bearwood.

R. pura (Alder). Sonning, Bottom Wood, and Bearwood.

R. nitidula (Drap.). Frequent.

Oxychilus alliarium (Miller) and *O. helveticum* (Blum). Bottom Wood.

O. cellarium (Müller). Common.

O. lucidum (Drap.). Caversham Warren.

Vitrea crystallina (Müller). Sonning.

Vitrina pellucida (Müller). Frequent.

Limax marginatus Müller. Bearwood.

L. flavus L. Reading.

Unio pictorum L. Common in the Thames.

Anodonta anatina (L.). Common.

A. cygnea (L.). Very fine specimens used to be found in a pond near Mortimer, but this has been destroyed.

Sphærium rivicola (Leach). Frequent in the Thames at Sonning.

S. corneum (L.). Common.

S. lacustre (Müller). Frequent in the Thames.

Pisidium amnicum (Müller). Frequent in the Thames.

P. supinum Schmidt. Frequent in the Thames.

P. personatum Malm. In a small ditch at Bearwood Lake and a marsh at the back of St. Patrick's Hall. My thanks are due to Mr. A. E. Ellis for identifying the last two species.

ASPECTS OF BIVALVE COLOURATION.

By A. Comfort, M.A., M.B.

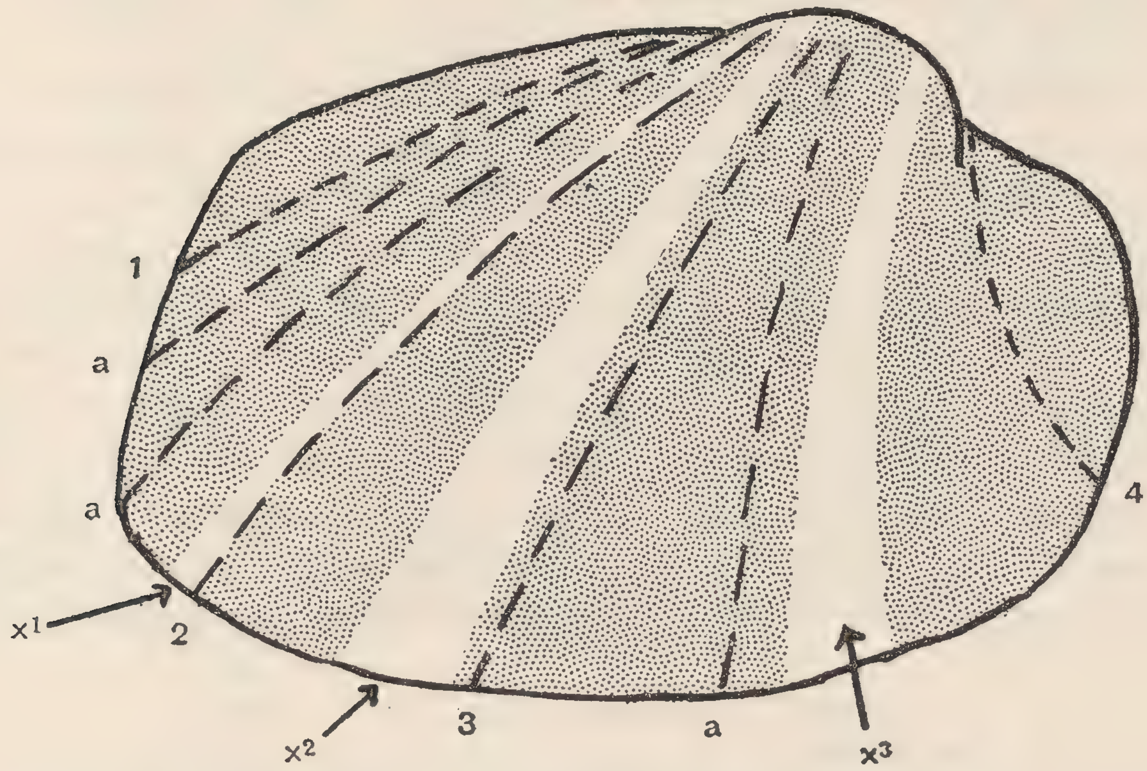
The studies of univalve banding which have been appearing since 1900 have thrown an enormous amount of light both upon general biology and genetics and upon molluscan zoology. As a matter of convenience, the majority of this research has been done upon land mollusca, which are reasonably tractable material for confirmatory experiment. Our knowledge of the biology of bivalve pigmentation is bound to depend upon field work and the examination of shells, since the breeding of marine bivalves under controlled conditions is beyond the powers of individual workers who have no special facilities, and accordingly there is a great deal less information available in this field than in the case of the univalves.

Bivalve shell pigmentation poses a number of highly important questions in biology and physiology, and, in particular, in the biology of a group which has undergone differentiation against the stream of general evolution, away from the free-living and frequently toward a sessile or semi-sessile state. The study of groups of this kind provides some of the most valuable pointers to the mechanisms by which species are modified and individuals selected. I have confined myself here to the problems raised by the wide variation of shell-patterning in local colonies and in individuals. Of these the most interesting are the proportion of hereditary, anatomical, and environmental factors in producing the pattern of a given individual; the function of these colour-patterns; the nature and mode of action of the environmental factors, and whether they act directly or by selection; and finally the physiology of pigment production, and the means by which the striking degree of bilateral symmetry in patterning is produced.

In most of the higher organisms, pigmentation is of two kinds—a constant pattern which is heritable and largely modified by selection, and an individual pattern which is protective and may be environmentally modified. The predominance of the first is established among mammals, but lower forms have an extensive physiological mechanism which controls the second, through the interaction of the visual mechanism, the skin, and certain chromatotrophic hormones. Throughout the animal kingdom there is a close relationship between pigment cells and photosensitive cells. This relationship exists in the mollusca, and in most of them, whether they possess special sense organs or not, the function is mainly localized in the mantle, of which the shell is a secretion. Where there is no external shell, as in cephalopods, the mantle has acquired the power of undergoing rapid colour changes, which are probably independent of the specialized eyes. Among bivalves there seem to be two lines of development of the undifferentiated sight-pigmentation mechanism—towards the emergence of special sense organs in free-living forms (*Arca*, *Chlamys*) and towards the emphasis on pigmentary control in specialized and sessile forms, which goes hand in hand with loss of activity, of sense organs already differentiated, and of the power to adapt (e.g. *Teredo*). Species possessing this pigmentary mechanism to the exclusion of a separate visual sense tend to be modified individually or in small colonies by local environmental factors which differ from factors producing mutation in that they are limited by the colour potentialities of the mantle. It seems likely that while, in the more variable bivalves, the grouping of potentially colour-producing cells is anatomical and heritable, their activity at any time is dependent upon activation by the environment. The patterns of many such forms tend to consist of blotches related to the growth-lines but radially arranged. If this sort of pattern is genetically determined, then some substance must be acting upon the mantle at regular intervals, possibly a sex hormone which appears cyclically and can induce pigment-production by the mantle-cells according to a genetic factor present in those cells. This seems far less likely than that local factors such as light and temperature act seasonally upon single individuals, or, more probably still, that a combination of both processes is at work. Whichever is the case, there is a distinct anatomical tendency for certain areas of the mantle to produce pigment and others to eschew it, so that dark and pale rays, which have a definite morphological relation to the shell and animal from group to group, tend to be produced, and the blotch-pattern to lie in this archetypal pattern. Again, as one might infer from the known light-pigment relationship, in burrowing forms it is the exposed areas which are pigmented, an observation which coincides with Sharp's description of the localization of photosensitive cells at the siphonal end. The striking perisiphonal pigmentation of *Pholas* suggests that such pigmentation is now " fixed " in the genetic sense, and persists even when the light-stimulus is withdrawn by deep burrowing. The feature which is displayed in this visuo-pigmentary system, more clearly by the mollusca than by almost any other group is the interchangeability of visuo-perceptive and visuo-pigmentary functions in similar or identical forms (cf. *Onchidium*).

With these theoretical ideas in mind I attempted to see whether any such relationships could be made out in the band-pattern of a typically variable form, *Paphia pullastra*. The colour-patterns of these molluscs vary greatly in individuals and localities. They were dismissed rather summarily by Jeffreys as being " of every conceivable colour and design "—a remark which might apply to *Cepæa nemoralis* and other forms whose banding can be analysed. *P. pullastra* shows a basic pattern with variations of individuals or colonies in exactly the same way as the *Helices*, with the difference that because the shell is bilaterally symmetrical, it is possible to follow the process of colour formation, and to detect the points at which the secreting edges begin and cease to lay down coloured shell.

Examination of long series of these shells gives a clue to the anatomical distribution of the chromogenic cells in the mantle. There are four recognizable zones which produce pigment regularly, and three which tend to produce none. In each of the pigmentary zones there are one or more points of maximum activity, which tend to be represented on the shell by dark rays. The nature of the process of colour-secretion is suggested by the form of the markings, which are common to many molluscs (e.g. *Theodoxus*, *Conus*), inverted Y-shaped and V-shaped markings, and triangular blotches, with the apex towards the youngest part of the shell, as if the pigment-production begins at a point and spreads to adjacent parts of the mantle ; the markings become V-shaped or remain solid according as the cells first affected cease or continue to secrete.



Band analysis of *Paphia pullastra L.* (Worthing Beach, 1946.)

It is possible to analyse the band patterns in any given colony, using somewhat the same conventional signs as are used in the case of *C. nemoralis*, the bands being numbered from behind forward, the pale areas being represented by commas in the case of the two posterior rays and by an X in the case of the very constant anterior ray, which appears in many bivalve species, and seems to represent a specially differentiated zone of mantle. The first zone, containing two confluent bands (1, 1*a*) is situated posteriorly to the posterior umbonal ridge. It is in this region that most *pullastra* are pigmented, and that in almost all specimens the pigmentation is most intense here. These facts are related to the habit of the animal, since this is the only part of the shell which is normally exposed in life, and the only part where the action of light on the mantle might be a direct factor in pigment production. After these bands there follows normally a slight pale ray, occupying the posterior umbonal ridge itself. Band 2, anterior to this, is normally wide and single, shading off into irregular brownish pigmentation. The next zone contains two bands (3, 3*a*), one crossing the valve at its narrowest point, and the second some distance anterior to it. Just posterior to the anterior umbonal ridge is a well-marked pale area, which is seen in almost all shells, even the darkest, and which is common to this and other species of *Paphia*, and possibly to bivalves in general, rather as the supramarginal band is common to most *Helices* (x). The anterior part of the shell is occupied by another dark zone, containing one or more bands (4). Many of these pigment-zones, especially 3 and 3*a*, tend to function intermittently, producing well-marked blotches which are bilaterally symmetrical, absent from young shells, and apt to occur at regular intervals. These are represented by * following the band-numeral. The very striking similarity which they show on the two valves indicates pigment is produced in both the opposed mantle edges in the same region and to the same degree. They also occur in several bands at the same time, and their periodic recurrence makes me wonder if they may not be seasonal. The relation of cold currents to pigment production in shells was noticed by Darwin and by Fischer, and it is possible that these dark varices are produced when the water-temperature falls. Their position always corresponds to one of the bands, and suggests a burst of activity by a pre-existing patch of chromophores.

Sporadic examples of *P. pullastra* are generally of the *1 a* or *1 2* type, and sometimes show patches of pigment in 3 or dense pigmentation at 4, which, like 1 and 1*a*, is the region most often exposed. A colony at Margate consisted almost wholly of shells of these types, living on clean sand and rock. At Worthing, however, where the species co-exists with *P. aurea*, on muddy sand and stones, the variation of marking was far wider, and both species showed very dark patterns. Of the specimens taken, the following table shows the approximate band distribution :—

		%
Total spp.	74	100
No pigment	5	6·9
1 2 only or predominant	16	24·6
3 present	39	52
Diffuse pigment	9	12·5
4 present	41	55·4
x present (as a distinct ray)	17	22·9

The x band can sometimes be identified in pale individuals, even when pigmentation is otherwise confined to *1 2*. It is equally recognizable in the shells of *P. aurea* from the same station, and of *P. rhomboides* from Loch Linnhe. The tendency in the Worthing shells of *P. aurea* is for the linear pigmentation to be general, and the general pattern to be *1*, *2*, *3a*, *4* with a greater tendency to form subsidiary bands : 1 may be followed by two or more such bands, and 2 by a band at 2*a*.

The blotches of colour which occur especially in 3, but occasionally also in other bands, present certain definite features in this series. They do not occur on shells younger than about 2 cm. in length, where the tendency is to uniform pallor or uniform pigmentation. Blotches frequently appear in more than one band at a time, and in these cases they tend to coincide with the line of shell increment for a particular age, showing that the production of pigment in various parts of the mantle occurred at the same time. In any series of shells there is also a definite tendency for the specimens to be divisible into groups, in which the line of blotches occurs at the same distance from the umbo. This suggests strongly that the deposition may be seasonal, and related either to temperature or to the reproductive cycle of the animal.

The microscope shows little about the structure of these blotches, except that the colour is confined to the periostracum, and is most marked at the edges of the scales.

I have tried to show, as a preliminary, that *P. pullastra* lends itself to this sort of investigation, and that its banding can be analysed for reference. In addition, it has the merits of being generally distributed, having three near British congeners and a very closely related Mediterranean form, and belonging to a group whose shell morphology is well worked out. It should be possible by extensive dredging, when this can again be done, to collect enough parallel histological material to verify the conclusions which the shells suggest, namely (1) that discontinuous pigmentation is the result of environmental stimuli acting on a pre-existing, probably hereditary, pattern of mantle chromophores, which may be related to the system of ocelli in free-living and unspecialized molluscs, and which reaches its highest development in the light-sensitive skin of the cephalopods, (2) that the anatomical pattern of this system is similar in related groups, and may be common to the majority of bivalves, especially in the case of the pale band I have labelled x, (3) that external factors, possibly seasonal, may waken activity in dormant chromophore zones, but cannot as a rule produce pigment outside them, (4) that the function of the pigmentary pattern is protective, but that it may possess other functions in the animal economy, as pterin formation does in lepidoptera.

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EDITORIAL NOTES.

ADANSON'S well-known monograph on the mollusca of Senegal appeared in 1757. The fate of his shell collection has long been a matter of doubt, and as recently as 1928 Lamy wrote that the malacological portion of Adanson's collections must be considered lost. Shortly afterwards the Paris Natural History Museum acquired the herbarium formed by Professor A. Chevalier, who had specialized in the flora of Senegal. This herbarium existed in the Chateau de Balaine (department of Allier) which still belonged to the Adanson family. Emile Doumet, a grandson of the conchologist Adanson, had formed at Cette a regular museum of natural history and art, and when he died in 1869 his son Paul Napoléon Doumet-Adanson removed these collections bodily to Balaine. He died in 1897, and in 1939 the present head of the family, H. M. de Rocquigny-Adanson, presented the mollusca, which proved to be Adanson's missing collection, to the Paris Museum. The shells have been most carefully studied by Fischer-Piette with the collaboration of P. H. Fischer, Lamy, and Pallary, and they found the original labels for the most part in existence and readily decipherable. The result of their work appeared in nos. 2, 3, and 4 of vol. 85 of the *Journal de Conchyliologie*.

The *Nautilus*, vol. 59, no. 3, pp. 97–101, prints a most interesting letter received by Henry Dodge from G. Mermod, the Curator of Invertebrates at Geneva Museum, on the subject of their mollusca collections. It records details about the collections of Hwass, Brot, Bourguignat, Morelet, and Moricand, and lists 67 specimens of *Conus* from the Hwass collection which may be considered the originals of figures in the *Encyclopédie Méthodique*.

Mermod's letter also mentions that the Shuttleworth collection is at Berne, that of Mousson at Zurich, that of Charpentier at Lausanne, while Neuchatel possesses portions of the collections of Godet, Agassiz, and Desor.

In the *Nautilus*, 59, pp. 115–121, H. B. Baker discusses a number of Férussac's generic names, with reference to Kennard's researches in *Proc. Malac. Soc*. xxv, pp. 12–17 and 105–118.

In the same volume, p. 36, *Valvata piscinalis* (Müller) is recorded as occurring in Lake Erie. It is already known to be abundant in Lake Ontario.

In vol. 60, p. 34, of the same serial W. M. Ingram records *Deroceras agreste* L. [Agriolimax agrestis] feeding on a Pill-bug, *Armadillidium vulgare.*

" The slug was feeding on the under surface of the head and had successfully rasped through the relatively thin exoskeleton on the ventral surface, cleaning out the flesh that was within the pill-bug's head. The legs, too, were rasped away as the slug's radula moved along the ventral surface. The slug made no attempt to rasp through the tough exoskeleton on the dorsal surface."

The following " Note sur l'infection des salades par l'*Arion rufus* " was published by Caziot in the " Feuille des Jeunes Naturalistes " 41, 91, 1911, and has been obligingly translated by Dr. Hopwood.

Under the heading " Notes et Communications ", *L'Illustration* for 31st December last reports that Dr. Barabaschi thinks he can affirm that slugs are able to carry the typhoid fever bacillus and contaminate the leaves of the vegetables they frequent. The Editor adds that many other small animals must do the same thing.

M. Proost, the learned Director of Agriculture for Belgium, came across an analogous case some years ago, and communicated it to the Scientific Society of Belgium at the reunion of the Congress of the " Ligue du coin de terre " held in Brussels last August.

Here are the facts as he told them to me :—

This eminent official knew a family of vegetarians in the suburbs of Brussels who lived almost exclusively on vegetables raised in their own garden, surrounded on all sides by a wall, except for one part where it was bounded by a hedge. On the other side of the hedge was a small path where the passers by were apt to commit a nuisance. M. Proost found that on rainy days numerous *Arion rufus* L. fed on the human fæces lying on the path. He then understood, particularly after dissection of some of the slugs, why the vegetarians' children were constantly in need of treatment to expel the intestinal worms with which they were infested. The *Arion* carried the eggs of *Ascaris lumbricoides* and left them in its slime-tracks on the leaves of the plants.

Immediately the hedge was replaced by a wall the trouble ceased.

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BRITISH SNAILS ABROAD.

By A. Tindell Hopwood, D.Sc., F.L.S., British Museum (Natural History).

(*Presidential Address delivered 2nd November, 1946.*)

That insular mode of thought said to characterize the British was never better illustrated than by the journalist who headed his report " The Great Storm: Continent Isolated ". Between his heading and mine there is this difference, that mine is intentional, for, although " Foreign Snails Invade Britain " might accord more closely with the facts, it would certainly be liable to mislead. Admittedly our land snails are invaders from foreign parts, but, like the followers of Norman William, they have been here long enough to acquire the natives' birthright, and to regard those who stayed at home on the Continent as the foreigners.

When Boycott (1934) summed up the experience of a lifetime in " The Habitats of Land Mollusca in Britain " he expressly disclaimed " any serious comparison with the Continent ", neither do I presume to embark on so mighty a task. Even a superficial acquaintance with the literature is enough to show that considerable difficulties stand in the way. The most obvious of these difficulties is also the least; owing to the labours of Kennard and Woodward there are very few problems of synonymy which cannot be solved in a relatively short time. Much more serious are the difficulties which arise from a lack of information, ecological and other. As an example, consider the vertical distribution of a species. British workers seldom think to tell us the height of their localities above sea level. Jackson and Standen (1913) set a notable example in their Prestatyn list, but very few have copied them. Taylor occasionally gives a maximum height in Britain (e.g. *H. itala* not over 1,000 feet); more often he gives the maximum height reached in the Alps or Pyrenees, but he does not appear to have worked on any system.

Another thing one would often like to know is the aspect of the locus, or at least of the locality. Are the same species present and in the same profusion on the north-eastern side of a hill as on the south-western? Taylor quotes Lindsay's opinion that *H. obvoluta* only occurs on the north slope of the South Downs, and Beeston's rejoinder that it is more plentiful and larger on the southern slope, but information of this kind is extremely difficult to obtain. Nevertheless, the aspect and elevation affect the local climate as well as the microclimate of the locus, and the local climate does much to determine the presence or absence of a species. The amount of lime in the soil alone exceeds it in importance.

Boycott emphasized certain results of the presence or absence of lime in the soil, but one thing he did not mention except by implication, namely that calcareous soils and rocks are warmer than those from which lime is nearly or entirely absent. Moreover, calcareous soils are more friable than acid soils and for that reason afford not only better shelter in general, but also better breeding places for those species which, like *H. pomatia*, make excavations in the soil in which to deposit their eggs.

Of the nine species which Boycott lists as obligatory calcicoles all except one (*Helicella virgata*) occur in Germany, and their behaviour in that country is most instructive. Three of them (*Pomatias elegans*, *Abida secale*, and *Helicella itala*) are calcicole in S.W. Germany, but the others (*Ena montana*, *Cecilioides acicula*, *Helix pomatia*, *Helicodonta obvoluta*, and *Monacha cartusiana*) are ambicolous, that is to say they are indifferent to lime, although they are more abundant on calcareous soils (Lais, 1943). Lais says of *M. cartusiana* that it is restricted to calcareous soils on the Lower Rhine, but that on the Upper Rhine it occurs on soils poor in lime. These observations seem to show that certain of our calcicolous species can do with less lime as the climate becomes warmer towards the south.

That none of these species is Palæarctic in its distribution suggested analysing the British fauna into its component parts and plotting their Pleistocene history in a table. The allocation of the species is an endeavour to represent a consensus of opinion, rather than the views of any one author. Only occasionally is there any serious conflict, as, for example, when *H. nemoralis* is placed sometimes among the eastern and sometimes among the western species. Otherwise the differences are more apparent than real, and resolve themselves into differences of procedure or of definition.

All the species in the accompanying table are found in Britain, and most of them live in Germany and the Geneva basin. The Roman numerals at the heads of the columns for England and Germany indicate the Lower (I), Middle (II), and Upper (III) Pleistocene; PG stands for Post-glacial. The distribution in the English deposits is based on the papers of Kennard and Woodward checked against a table recently compiled by Kimball (cf. Zeuner, 1945, pp. 269–272). The German distribution is based on the work of Sandberger, Wüst, and Geyer. The Geneva list is taken from Favre (1927); the figures at the top of the columns refer to Favre's subdivisions of the Post-glacial. All the species listed in the German Post-glacial still live in that country, but that a species which now lives there has not been found as a fossil is indicated by an " R ".

Geologically, England and Germany have this in common, that neither country was ever completely covered by ice. In England the country south of a line from the Severn to the Thames was unglaciated; in Germany the ice-free area was that part of the country which lay between the Scandinavian and Alpine ice-sheets. The Geneva basin was completely glaciated and thereby sterilized. Nevertheless, the history of the repopulation of the Geneva basin broadly corresponds to the history of the faunas of England and Germany.

This fact, interesting though it is, is not so surprising as might at first appear. Many species of snails are very hardy and able to withstand the most severe winters. *Carychium minimum*, *Succinea putris*, *Cochlicopa lubrica*, *Pupilla muscorum*, *Vallonia pulchella*, *Euconulus fulvus*, *Retinella pura*, and *Vitrina pellucida* are common and widely spread throughout Siberia; all have the thin horny or glassy shells characteristic of snails which live in cold climates. The periglacial climate with its short, relatively hot, summers and long, intensely cold, winters was not very different from

	England				Germany				Geneva			
	I.	II.	III.	PG.	I.	II.	III.	PG.	PG. I.	PG. IIa.	PG. IIb.	R
Holarctic and Palæarctic—												
Carychium minimum (Müll.) –	*	*	*	*	*	*	*	*	*	*	*	*
Succinea pfeifferi Rossm.	*	*	*	*	*	*	*	*	*	*	*	*
,, *putris* (L.)	*	*	*	*	*	*	*	*	*	*	*	*
Cochlicopa lubrica (Müll.)	*	*	*	*	*	*	*	*	*	*	*	*
Columella edentula (Drap.)		*	*	*	*		*	*	*			*
Vertigo antivertigo (Drap.)	*	*	*	*	*	*	*	*	*	*	*	*
,, *pygmæa* (Drap.)		*	*	*	*	*	*	*	*	*	*	*
Pupilla muscorum (L)	*	*	*	*	*	*	*	*	*	*	*	*
Vallonia costata (Müll.)		*	*	*	*	*	*	*	*	*	*	*
,, *pulchella* (Müll.)	*	*	*	*	*	*	*	*	*	*	*	*
,, *excentrica* Sterki	*	*	*	*	cf.	*	cf.	*	*	*	*	*
Punctum pygmæum (Drap.)	*	*	*	*	*	*	*	*	*	*	*	*
Euconulus fulvus (Müll.)	*	*	*	*	*	*	*	*	*	*	*	*
Oxychilus cellarius (Müll.)		*	*	*		*	*	*	*	*	*	*
Retinella pura (Alder)				*	*		*	*	*	*	*	*
Zonitoides nitidus (Müll.)	*	*	*	*	*	*	*	*	*	*	*	*
Vitrina pellucida (Müll.)				*			*	*				*
Nordic—												
Clausilia bidentata Ström	*	*	*	*			*	*	*	*		*
Oxychilus alliarius (Miller)			*	*			?	*				
Retinella radiatula (Alder)		*	*	*	*	*	*	*	*	*	*	*
Arianta arbustorum (L.)	*	*	*	*	*	*	*	*	*	*	*	*
Alpine—												
Vertigo substriata Jeffr.				*	*		*	*	*	*		*
,, *alpestris* Alder				*	*		*	*	*	*		
Abida secale (Drap.)				*	*	*		*	*	*		*
Ena montana (Drap.)		*	*	*	*	*	?	*	*	*	*	*
Oxychilus helveticus (Blum)				*				R				*
Helicodonta obvoluta (Müll.)			*	*	*	*	*	*	*	*	*	*
European—												
Vertigo pusilla Müll.		*	*	*	*	*	*	*	*	*		*
Acanthinula aculeata (Müll.)		*	*	*	*		*	*	*	*	*	*
Ena obscura (Müll.)			*	*	*		*	*	*	*	*	*
Cochlodina laminata (Mont.)		*		*		*	*	*	*	*	*	*
Goniodiscus rotundatus (Müll.)		*	*	*	*	*	*	*	*	*	*	*
Vitrea crystallina (Müll.)	*	*	*	*	*	*	*	*	*	*	*	*
Hygromia hispida (L.)	*	*	*	*	*	*	*	*	*	*	*	*
Central European—												
Succinea oblonga Drap.		*	*	*	*	*	*	*			*	*
Clausilia dubia Drap.				*	*	*	*	*	*	*		*
Retinella nitidula (Drap.)		*	*	*	*	*	*	*	*	*	*	*
Helicigona lapicida (L.)		*	*	*	*		*	*	*	*	*	*
Hygromia striolata (C. Pfr.)				*	*	*	*	*		*	*	*
Western and South-Western—												
Pomatias elegans (Müll.)				*	*			*		*	*	*
Acme lineata (Drap.)				*				*		*	*	*
Azeca tridens (Pult.)		*	*	*		*		*				
Vertigo angustior Jeffr.			*	*	*	*	*	*	*	*	*	*
Lauria anglica (Fér).				*								
Acanthinula lamellata (Jeffr.)			*	*				*				
Clausilia rolphii Turton				*				R				
Balea perversa (L.)			*	*				*				*
Cecilioides acicula (Müll.)		*	*		*		*			*	*	*
Vitrina major Fér.								R		*		*
,, *pyrenaica* Fér.												
Helix nemoralis L.	*	*	*	*	*	*	*	*		*	*	*
Eastern and South-Eastern—												
Succinea elegans Risso		*	*	*			?	?				*
Laciniaria biplicata (Mont.)				*			*	*				
Helix hortensis Müll.		*	*	*		*	*	*	*	*	*	*
,, *pomatia* L.				*		*	*	*		*	*	*
Mediterranean—												
Pyramidula rupestris (Drap.)				*	*				*			*
Truncatellina cylindrica (Fér.)		*	*	*		*	*	*		*	*	*
Vertigo moulinsiana (Dupuy)		*	*	*		*	*	*			*	*
Lauria cylindracea (Da C.)			*	*				*				*
Oxychilus draparnaldi (Beck)				*	*			R	*	*		*
Helix aspersa Müll.				*				R				*
Monacha cartusiana (Müll.)				*				R		*	*	*
,, *cantiana* (Mont.)				*				R				
Helicella caperata (Mont.)				*				*				
,, *virgata* (Da C.)				*								
,, *itala* (L.)		*	*	*			?	*		*	*	*
Cochlicella acuta (Müll.)				*				*				

that of Siberia, so that it is very unlikely that the Holarctic species were expelled either from Southern England or from Central Germany. Consequently they were in a position to follow the ice as it retreated and glacial conditions gave place to interglacial. Under such circumstances they were naturally the first to enter any glaciated area, and at the end of the last glacial episode were the first to re-enter the Geneva basin. Moreover, as conditions improved, less hardy species followed on in an order determined primarily by their thermal requirements, and in this way the sequence of events in the Geneva basin came broadly to agree with what was taking place in other parts of Europe. The closest agreement is shown by those species included under the headings Holarctic to Central European inclusive, and least in the succeeding sections. Where the British and Genevan lists differ in the Holarctic to Central European sections, an important cause is to be sought in the differences between the two types of locality. The fauna shown under England (I) is that of the Cromer Forest Bed, a lowland woods or forest fauna, whereas Geneva (PG I) records the fauna of a high plain surrounded by mountains, the whole area being 1,000 feet or more above sea-level.

Another consequence of the more genial climate of post-glacial times was the segregation of the species according to their temperature reactions. Those which could withstand a wide range of temperatures penetrated wherever they found suitable conditions; they are the Holarctic and Palæarctic forms. Others, less tolerant, found their main refuge in mountainous regions, but kept a somewhat precarious footing in the plains; these are the Nordic species. The Alpine group of stenothermous species, even less tolerant of a moderate degree of warmth, became restricted to the mountains and disappeared from the plains. At the same time, those species which require more equable conditions were able to migrate along the coastal belt of Western Europe to the British Isles. Hence the southern species reached this country at a later date than those of more northerly distribution.

The picture thus drawn is certainly over-simplified, and its outlines are blurred for want of precise information. Particularly is this true of the faunas of the pre-glacial Red Crag and Icenian deposits, as well as of the Lower Pleistocene Cromer Forest Bed. Nevertheless, the agreement between the pre-glacial fauna of the crags and the fauna of the first Interglacial is so close that it cannot be wholly a matter of chance. As recorded by Harmer, the pre-glacial fauna includes *Carychium minimum*, *Succinea oblonga*, *S. elegans*, *Columella edentula*, *Pupilla muscorum*, *Lauria cylindracea*, *Vallonia pulchella*, *V. excentrica*, *Cochlicopa lubrica*, *Hygromia hispida*, *Arianta arbustorum*, *Helix hortensis* and *H. nemoralis*, an assemblage entirely in keeping with the gradual cooling of the climate which became so marked in the newer Red Crag. That *Lauria cylindracea* is a southern species makes no difference, for its present range extends as far north as Bergen, where it occurs abundantly in suitable spots; the important fact is that there are no changes of note in the succeeding fauna, that of the Cromer Forest Bed. Not until the middle Pleistocene is there any great influx from more distant regions. Apart from *Cochlodina laminata* all the species found in the second Interglacial reappear in the third, where their numbers are swollen by still more immigrants. The process is repeated in post-glacial times.

From the fact that there were not less than four glaciations of Britain during the Pleistocene, it is obvious that there were wide fluctuations of climate, and that some knowledge of how our species behave under conditions different from those now existing in Britain is of importance. For this reason I have selected the following species from among those given in the table above, and added a few notes about each of them.

Acme lineata (Drap.).—In Britain indifferent to lime, but calcicole in S.W. Germany. As a general rule it only occurs in fairly damp places, but in the Geneva basin it avoids humid spots and is found in light woodland, shrubby places, dry swards, and especially in the heaths or "garides" ("formations surchauffées par le soleil, plus sèches et plus arides que toutes les autres". Favre, 1927, p. 312), where it is represented exclusively by its variety *sublineata* Andreæ.

Succinea oblonga Drap.—An obligatory hygrophile in Britain, but in Germany occurs also in gardens, on ruins, and on walls. In the neighbourhood of Basel it is found on dry slopes, together with *Helicella itala* (Bollinger, 1909).

Cochlicopa lubrica (Müll.).—Generally a hygrophile or mesophile species, but in Germany and Switzerland the form *exigua* Menke occurs in the driest situations, whereas the form *nitens* Kokeil is exclusively palustral.

Pyramidula rupestris (Drap.).—Xerophilous and ambicolous in Britain, but calcicole in S.W. Germany. In the Geneva basin it may be sylvestral and ambicolous.

Ena montana (Drap.).—Sylvestral and an obligatory calcicole in Britain, becoming ambicolous in S.W. Germany. Fairly common in all the forests of the Geneva basin; hygrophile and generally distributed in Switzerland at altitudes from 2,600 to 3,900 feet.

Cochlodina laminata (Mont.).—Calcicole in Britain; ambicolous in S.W. Germany and Switzerland. Mesophile towards the north of its range, it becomes a facultative xerophile as it is traced southwards.

Vitrea crystallina (Müll.).—Hygrophile and indifferent to lime in Britain, Germany, and Switzerland, but in the last-named country it tends to become xerophilous as the altitude increases, and at 5,250 feet in the Geneva area is frequently found in dry swards on rocks facing south.

Monacha cartusiana (Müll.).—Obligatory xerophile and calcicole in Britain, but in Switzerland tending to be mesophile with xerophilous and palustral forms.

Arianta arbustorum (L.).—Ambicolous and moisture-loving throughout its range. Rare on the Swiss plateau (1,100 to 1,300 feet), but widely spread in regions over 2,300 to 2,600 feet. Above the zone of trees it is particularly abundant in meadows facing to the north.

Helix hortensis (Müll.) and *H. nemoralis* L.—These two species are in many ways complementary. The former is more northern and montane in its distribution than the latter. It is also less dependent on moisture, though both have some title to be classed as facultative xerophiles, whether in Britain or in Switzerland. *H. nemoralis* is mesophile or hygrophile and very common on the Swiss plateau. It becomes rare immediately on leaving the plain, but has been recorded at heights up to 4,250 feet. On the other hand, *H. hortensis* is very rare on the plain and is not common below altitudes of 2,300 to 2,600 feet; it goes up to a maximum of 7,200 to 7,900 feet. The importance of this difference in vertical range lies in the way in which it is reflected in the British Isles. Here *H. hortensis* becomes more frequent as it is traced from south to north, whereas *H. nemoralis* becomes less frequent. In both countries the distribution follows the climatic gradient.

One point in the table is obscure. It will be noticed that in time *H. nemoralis* precedes *H. hortensis* in England and Germany, whereas in the Geneva basin *H. hortensis* appears first. If, as many authorities think, both species are of eastern or south-eastern origin, one would expect *H. hortensis* to appear first in all three countries because of its preference for cooler conditions. R. F. Scharff maintained that *H. nemoralis* is of south-western origin; if this view is accepted the difficulty disappears. Another explanation might be that the lower Pleistocene deposits of England and Germany contain a mammalian fauna of a woodland type, and that *H. nemoralis* is the appropriate species to accompany such a fauna. The true explanation seems to be, however, that the climate in Britain was too warm for *H. hortensis* but not for *H. nemoralis*; certainly the presence of *Hippopotamus* in the Cromer Forest Bed suggests a temperature too high for the former, and this view is strengthened by the more southerly range of *H. nemoralis* at the present day.

Helicella itala (L.).—This species affords an additional instance of the influence of the climatic gradient. According to Taylor it is found at 5,000 to 6,600 feet in the Pyrenees, usually between 4,000 and 5,000 feet in the Alps, and not above 1,000 feet in Britain.

The climatic gradient is evidently of importance in its influence on distribution. As is well known Taylor laid much stress on the effects of competition among snails; later workers have failed to confirm his conclusions, and to-day most students regard competition as unimportant (cf. Boycott, 1934). No one, however, questions the importance of the climate, which, given a soil containing an adequate amount of lime, seems to be the major factor in determining distribution. By its means many problems may be solved, the discontinuous distribution of *Vertigo alpestris*, for example. Taken together with the thermal tolerance of different species, it will explain the overlap of distributional range, as that between the geographical ranges of *H. nemoralis* and *H. hortensis*, or between the vertical ranges of the montane *Clausilia tettelbachiana* Westerl., which lives above its close ally *C. dubia* with which it is said to interbreed where their ranges overlap (Rensch, 1934). Nevertheless, the gradient is not a key which will open every door, and other factors may mask its effects. For example, *Oxychilus cellarius* is known in this country as a facultative xerophile, although it is usually found in damp places. In Switzerland, it may occur on rocks "roasted by the sun". This does not necessarily prove a very high degree of thermo-xerophily, for the rocks contain nooks and crannies in which the snails may find both shelter and moisture, and the microclimate of the locus masks the effects of the general climatic gradient.

In these few notes I have tried to do three things, namely :—

(i) To indicate some points of importance often neglected in our local lists.

(ii) To compare the Pleistocene faunas of England and Germany in tabular form. Unfortunately, knowledge of the French Pleistocene is not sufficiently complete for comparison with that country to be practicable.

(iii) To show how a knowledge of continental conditions at the present day may help in interpreting the table, and also help to explain some aspects of the British distribution of the species.

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FURTHER EXTENSION OF THE RANGE OF *CREPIDULA FORNICATA* (L.).

By G. M. Spooner (Naturalist to the Marine Biol. Association).

The spread of the Slipper Limpet, *Crepidula fornicata* (L.), is a matter both of general zoological interest and of practical concern to those whose oyster beds they threaten. The westward spread down the English Channel coast has been relatively slow and intermittent, and seemed to have come to a stop in Swanage Bay (Bloomer, 1945).[1] It is now possible, however, to report that the species has become firmly established in Weymouth Bay in the war years.

During regular visits to Weymouth over a period of years up to 1939 I became familiar with the molluscan fauna of Weymouth Bay, from the animals and shells cast up on the beach, particularly after strong easterly winds. Up to and including 1939 I never saw a sign of *Crepidula*. This species is of course one of the most readily disturbed by wave-action, since it lives exposed on the sea bed and is often attached to loose objects. My negative observations are supported by those of Bloomer for the coast between Chapman's Pool and Lulworth Cove.

For the years 1940 to 1943 inclusive I cannot speak, but in the autumn of 1944 a number of fresh specimens were noticed, washed up on Weymouth Beach, including the usual clusters. By December, 1945, *Crepidula* was one of the two most plentiful molluscs represented in the beach litter, both whole animals and empty shells being much more plentiful than a year previously. In July, 1946, I examined a number of clusters, and, judging from the rings on the shell, concluded that the oldest individuals were six, or possibly seven, years old, but not older.

The available evidence seems to point fairly definitely to 1939 or 1940 (probably the latter) as the year when *Crepidula* spread from Swanage to Weymouth Bay. It is not surprising that, once this gap had been jumped, the species readily established itself in the new area, where the conditions, not unlike those of Studland Bay, would be expected to suit it. In actual fact it appears to have become a dominant member of the fauna in quite a short time.

Obstacles to a further westward spread are formidable, since westward of Portland Bill there can scarcely be any favourable ground along the length of the Chesil Beach, and probably none up to the region of the Exe Estuary. Observers, however, would do well to keep a sharp look-out for further movements.

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[1] *Journ. Conch.*, vol. 22, p. 147.

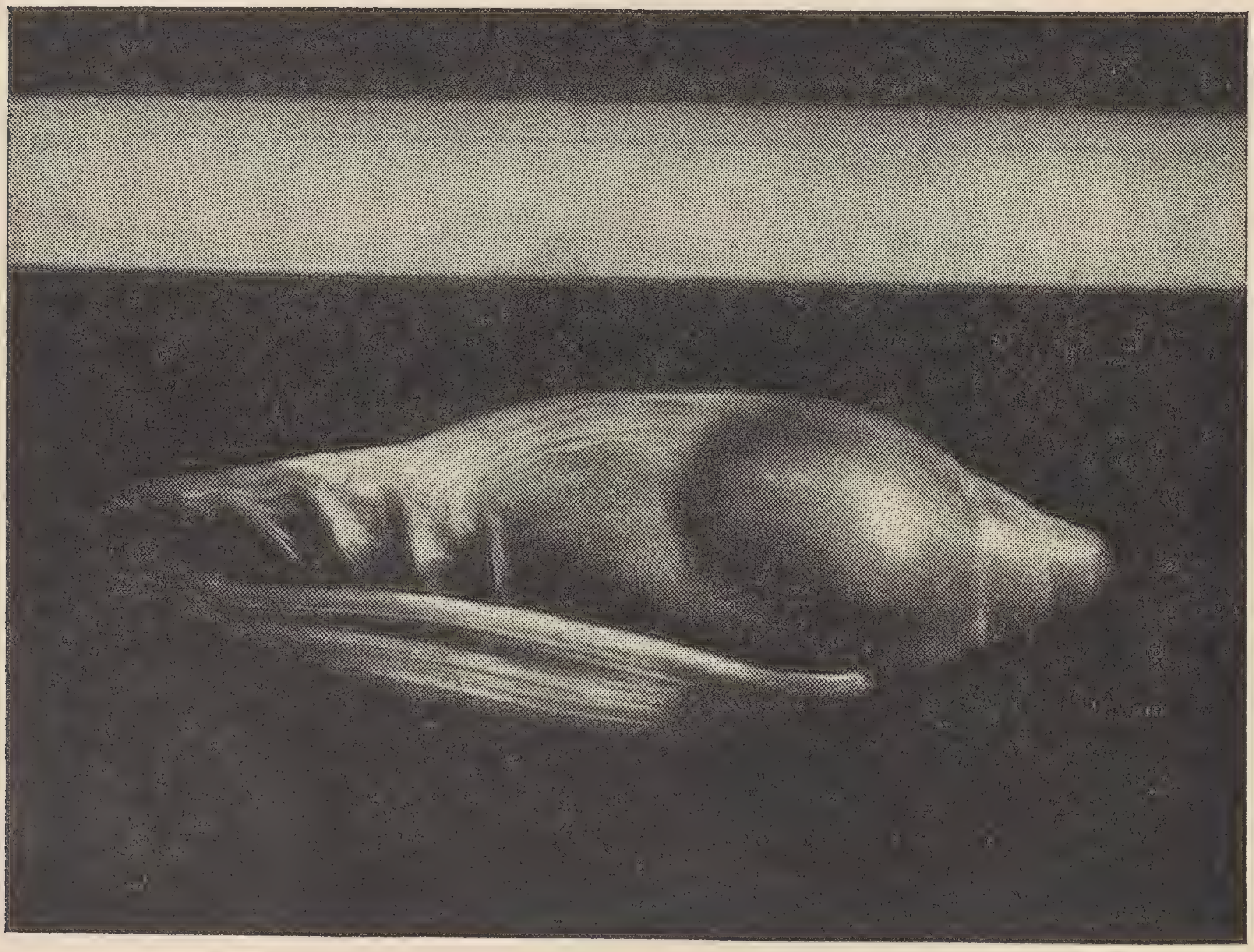
A NEW SOUTH AFRICAN VOLUTID.

By J. R. le B. Tomlin.

(*Read before the Society, 3rd May, 1947.*)

Trawling in deep water in the Algoa Bay area has produced some interesting new species of mollusca. The splendid shell which is now described is perhaps the most striking form discovered in South African waters since *Neptuneopsis* turned up off the Cape almost half a century ago. Sowerby, who described it at Gilchrist's request, was minded to place it in the Volutidæ, and Thiele ratified this diagnosis in his *Handbuch*.

The present species, while also a Volutid, is much more akin in shape and general appearance to the *Scaphella* group, but has several noteworthy features which seem to justify one in founding a new genus for it.



Afrivoluta pringlei n. sp.

The columellar plaits, four in number, are extraordinarily prominent and massive; the whole shell is shining and polished, with a large, very prominent reddish callus on the body whorl immediately below the suture and above the aperture, and extending for some distance down beside the aperture. The shell has very superficial spiral sculpture, the spirals being broad and further apart on the body whorl below the suture for about one-fifth of its length, but gradually becoming fine and almost microscopic.

I propose to call the genus *Afrivoluta*, and to name the genotype *pringlei* after the Director of the Port Elizabeth Museum and Snake Park, which was recently visited by the King and Queen.

Afrivoluta pringlei new genus and species

Shell large, elongate, with blunt, rather swollen apex, whorls five; there are five close lines of growth, and very faint, irregular, superficial spirals on the body whorl which become almost microscopic on the lower three-quarters of the shell: colour chestnut-brown with two lighter brood bands of pale reddish brown in the middle of the body whorl and a narrow whitish sutural edging; columellar plaits red; interior a rusty reddish brown. At the top of the body whorl immediately below the suture a large prominent rounded reddish callus, measuring about an inch in diameter, descends from the suture past the apex of the aperture. The columella projects somewhat below the base of the aperture: peristome thickened.

Length $4\frac{1}{4}$ inches; diam. max. slightly over $1\frac{1}{2}$ inches.
Length of aperture 3 inches; breadth $\frac{9}{16}$ inch.
Hab.: South-east of Cape Recife in 120 fathoms.

It has also been dredged off Jeffreys Bay.

A NEW SOUTH AFRICAN CYMATIID

By J. R. le B. Tomlin.

(*Read before the Society, 3rd May, 1947.*)

The new species figured and described below is closely akin to that for which Cossmann founded *Fusitriton*, a new subgenus of *Priene* H. & A. Adams, though the two or three examples that I have seen are devoid of periostracum. This lack, however, is probably due to wear and tear.

Lamarck's *Triton cancellatus* which was Cossmann's[1] type has a complete brownish periostracum. Its distribution as given by Tryon[2] seems rather problematical, though I can confirm his doubtful South American record by specimens received from Mar del Plata (Dubois).

Fusitriton is nearly related to Schumacher's *Gyrina*, and both groups are placed by Thiele as sections of *Argobuccinum* Brug.

Gyrina is typified by the well-known Mediterranean *gigantea* Lamarck, which has of recent years been dredged off the South Wales coast (see this *Journal*, vol. 14, p. 366).

I am inclined to consider both *Gyrina* and *Fusitriton* distinct genera, and to describe the Cape shell as *Fusitriton algoensis* n. sp.

The shell in general apperance, build, and size is similiar to *Priene oregonensis* Redfield from the Pacific side of America, but differs considerably in the much greater length of canal, in its thinner and more delicate texture and in possessing prominent varices on each whorl. Whorls eight in number with very distinct latticed sculpture, formed by rather distant axial ribs crossed at right angles and at very regular intervals by spirals of much the same strength. The points where the axials and spirals cross are marked by prominent nodes. Below the periphery the axials tend to become much fainter. Inner lip smooth: canal long and retracted: the shell is entirely white but, as suggested above, may be decorticated. Operculum with apical initial point as in *Priene*.

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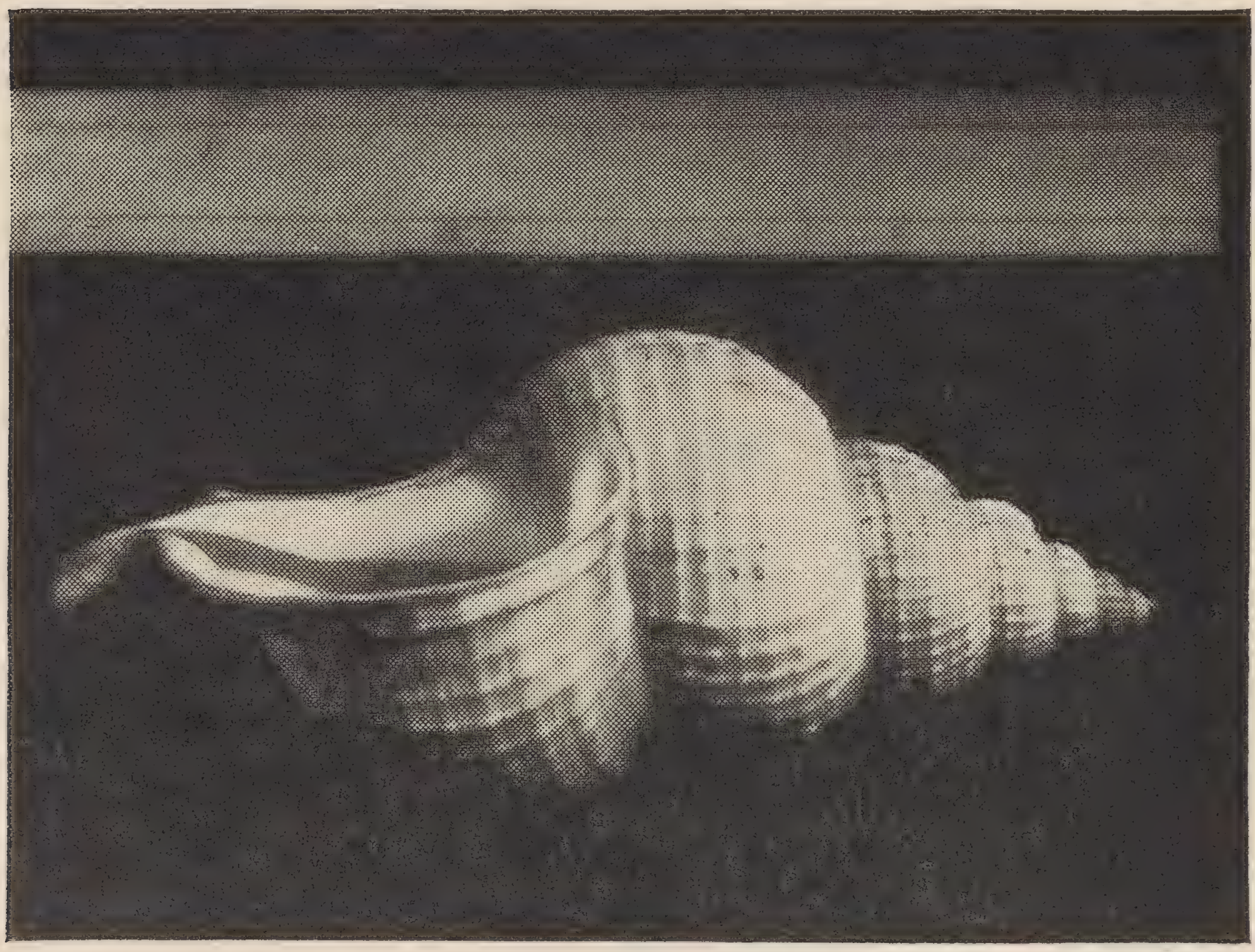
[1] *Essais Paléoconch.*, Comp., **5**, p. 109, 1903.

[2] *Man. Conch.*, **3**, p. 34.



Fusitriton algoensis n. sp.

Long $4\frac{3}{4}$ inches; diam. max. $2\frac{1}{8}$ inches.

Hab.: Algoa Bay, 140 fathoms, 20 miles south of Cape Recife.

I am indebted to Mr. Pringle, of Port Elizabeth, for this fine shell, and hope to be able to publish a description of its anatomy.

Mr. Salisbury has very kindly provided the photo.

The Cepæa nemoralis population of a Gorse-patch.—On the shore of the Cheshire Dee between Gayton and Heswall a seawall protects sand-dunes now turfed over, and bearing patches of Gorse and Burnet Rose. In October, 1945, I noticed that one such Gorse-patch, measuring 15 ft. by 6 ft. had been burnt over and was a ruin of blackened stems, interspersed with young green shoots (up to 4 in. long) from the roots. Dead shells of *Cepæa nemoralis* seemed very abundant, so all that could be found were collected, and amounted to the surprising number of 69 adults and 23 juveniles. No doubt a good many were overlooked or had been completely destroyed. As to colour, those with a yellow background outnumbered the red specimens by three to one.

The weather had been dry and warm, so probably the normal population of the patch had been swelled by refugees, but even then the number of shells obtained seems large. No living examples were found, and presumably recolonization of the patch had not begun.

N. F. McMillan.

MOLLUSCA OF WICKEN FEN.

By L. W. Stratton.

(Read before the Society, 3rd May, 1947.)

On Thursday, 1st August, 1946, I had an afternoon's collecting at Wicken Fen. It was not a good day for land snails, being sunny, very warm, with a stiff breeze blowing. Little or no rain had fallen since the freak storm of 26th July. In spite of adverse conditions some land snails were in evidence, and some of these seem to be additional to previous records.

In Adventurer's Fen, in the corner made by the junction of Monk's Lode with Wicken Lode, *Helicella virgata*, da C., and *H. itala*, L., were abundant with *Theba cantiana*, Montagu, and some *Trichia hispida*, L., on grass stems, nettles, and burdock. The following varieties of *H. virgata* were taken; *leucozona*, *lutescens*, *subalbida*, and *albicans*, and of *H. itala*, *bizonalis*, *lutescens*, *monozona*, *hypozona*, *hyalozonata*, *alba*, and *grisescens*. In *The Natural History of Wicken Fen*, vol. iii, Oldham mentions finding these two species in very small numbers by the brick kilns in Adventurer's Fen, some distance from the present locus. Half-grown *Cepæa nemoralis*, L., were observed on alder-buckthorn in Wicken Poors Fen, some 40 or 50 yards from the bank of Wicken Lode, the nearest "dry land".

Breed Fen is divided into two by a drain. The eastern half was down to wheat and oats. The western half (Milner White Plot) was grass with clumps and patches of sedge, many scattered thistles, and much ragwort on the cornfield side. *Helicella virgata* was abundant on the thistles and ragwort, and some were found on the grass. It was most common on the cornfield side, but was found right up to the edge of the drain separating Breed Fen from Wicken Sedge Fen, where it occurred with *Succinea putris*, L. The same varieties were found here as in Adventurer's Fen, but banded shells were much in the minority. Although search was made along the other bank of the drain this snail was not found in Wicken Sedge Fen itself.

Again on the cornfield side of Breed Fen, one adult and three half-grown *Cepæa hortensis*, Müller, were found on ragwort. The adult was an unbanded pink, with brown lip and pink rib. Two of the young were banded 12345, and the other was *hyalozonata*, 12345. On the other side of the cornfield, in Breed Fen Drove, four more *C. hortensis* were taken, all adults. Three, all normal white lips, were 12345, 1 : 345, and (123)(45). The fourth shell was yellow, with a distinct white peripheral band. An adult *Helix aspersa*, Müller, was also found in Breed Fen Drove, where *H. virgata* and *Theba cantiana* were common.

It would seem, as Oldham suggested, that the draining of the surrounding fens has resulted in the invasion of Wicken by land forms not previously found there.

FURTHER NOTES ON *PLANORBIS CORNEUS* (L.) IN WIRRAL.

By N. F. McMillan.

(*Read before the Society, 3rd May, 1947.*)

In a previous note on *Planorbis corneus* in the Wirral peninsula, Cheshire (*Journ. Conch.*, xxii, 103, 1944), I stated that the species did not appear to be native there. Two fairly recent visits to Burton Marsh, in the River Dee (November, 1945, and June, 1946) have made matters still more puzzling. During the last two years a large area of the freshwater part of Burton Marsh (i.e. that part lying above the embankment carrying the railway from Burton Point to Connah's Quay) has been reclaimed by draining and cropped. The highest drain has been made a few yards outside the Burton Manor grounds (they extend down to the top of the marsh), and is about 4 feet deep and a little narrower. It yielded no living mollusks, but in the excavated material piled beside the drain were scattered shells of *Lymnæa peregra* and two examples of *Planorbis corneus*, one a very " dead " young shell, but the other was a fine adult shell, quite fresh-looking. Near to where these shells were found is the drained site of a shallow pond, to whose former existence numerous dead *Typha*, now standing forlornly on dry land, testify. This pond, however, was on the Marsh, not in the Manor grounds, and it seems in the highest degree improbable that anyone would take the trouble to introduce *corneus* in such an out-of-the-way place. That part of Burton Marsh was not completely freed from marine influence until about 1898, when the embankment carrying the railway was made. Until that date the marsh was a grassy expanse, intersected by numerous tidal channels, but the site of the pond lies at the extreme top of the marsh where tidal influence must have been very slight.

In June, 1946, that part of the marsh lying between the railway embankment and Burton Cop, further down river, was examined, and the highest gutter was found to contain abundant *Planorbis corneus*, together with a normal freshwater fauna, including quantities of tadpoles. This part of the marsh is still affected by the tide, as the Cop (made in 1870) was broken through almost at once, and the gutters contain a marine or brackish-water fauna, except that holding *corneus*. Its presence here seems inexplicable. I do not know whether such a comparatively large mollusk could be carried by birds, but Burton Marsh is famous for its migrants.

Dr. Jackson, when recording *corneus* from Bidston Moss (*Lancs. and Ches. Fauna Committee Rept. for 1936*, p. 34) says " probably introduced ". This is correct, for in the *Proc. Merseyside Aquarium Soc.* for 1926–7, under the date 24th September, 1927, is the statement that " a pond on Bidston Moss was stocked with *Pl. corneus* some thirty years ago and never fails to yield a rich harvest of this handsome and useful snail ".

ARION ATER (L.) AND *A. RUFUS* (L.) IN BRITAIN AND THEIR SPECIFIC DIFFERENCES.

By H. E. Quick.

There has long been uncertainty as to whether more than one large species of *Arion* occurs in Britain and also as to nomenclature. The names *Arion ater*, *A. ater* var. *rufus*, and *A. empiricorum* have all been used. Investigation of material from various localities over the past two years indicates that we have at any rate two distinct species, and that they should be called *A. ater* (L.) and *A. rufus* (L.). There are physiological differences in mating behaviour as well as anatomical differences.

Collinge 1897 (1) considered that British and Irish examples should be referred to *empiricorum* Férussac and that *ater* L. and *rufus* L. were Continental species. Taylor 1907 (2) referred the British forms to *ater* L. and treated *rufus* and *empiricorum* as varieties or varying stages of maturity, and Oekland 1922 (3) refers the common Norwegian species, including black and the rarer white and mottled varieties, to *ater* L. The rarely found red and brown forms in Norway he refers to *rufus* L. and suspects that they have been introduced. He considers that the variety we know as *albolateralis* Roebuck should be called var. *media* Jensen.

There is general agreement that black slugs are characteristic of high altitudes, peaty bogs, and moorlands and fens, and the more northern regions, while brightly coloured slugs characterize warmer and richer lowlands and more southern regions.

Collinge 1897 (1*a*) figures *ater* with a small upper atrium and relatively short vas deferens, and *rufus* with a large upper atrium and relatively long vas deferens, and Pollonera's figures copied in Taylor's Monograph are in general agreement with this. Adams 1910 (4) described and figured the mating of *A. ater* showing relatively small upper atria everted, and a limited area of adhesion by means of suckers or ligulæ, between them. He noted that after a variable period of following and reciprocal mucus licking, actual coitus only lasted for about half an hour. There matters remained until Gerhardt 1940 (5) published his detailed observations on the mating process in *Arion*. He found that black slugs from Cambridge agreed on the whole with Adams' account, and he referred them to *ater* L. On the other hand, coloured slugs with pale soles and bright orange or red foot fringes from Swansea showed more bulky everted atria with a large area of adhesion, and actual coitus lasted for about two hours. He thought that the differences were sufficient to preclude crossing between the two forms, and that two large species of *Arion* occurred in Britain. He referred the Swansea form to *empiricorum* Fér. or perhaps *rufus* L., which might be a variety of Férussac's species. As to colour, he says that in Germany *empiricorum*, though generally coloured, may sometimes be completely black, but is uncertain whether *ater* is ever coloured.

Oekland's figures of the genitalia of the common Norwegian form conform in general with those of Collinge and Pollonera, and one would expect the common Norwegian slug to be *ater* L. The issue is somewhat confused, however, by Oekland's statement that coitus may last up to two hours. He says, however, that he has never personally witnessed the whole process and quotes the account of Adams and also of Kunkel 1916 (6), who was dealing with what he calls *empiricorum* Fér., so the duration of the process is left doubtful by Oekland.

In these circumstances it seems advisable to re-examine the British examples. Recent experience confirms the general impression that the common black form, which will be referred to as *ater* L., with a dark grey sole with lateral areas usually darker than the median, is characteristic of high ground, peaty moors, and sphagnum bogs. The foot fringe is sometimes black and sometimes a dirty yellowish brown. Sometimes the whole animal, including the median area of the sole, is black, the var. *aterrima* Taylor. Occasionally in such places a dark dull reddish brown variety and a dark smoky brown one may be found. The form that differs most from this is found at Swansea and in all probability elsewhere. It is larger than the black mountain form, 14 cm. or 15 cm., while the mountain bog form is from 10 cm. to 12 or 13 cm. It will be referred to as *rufus* L. The colour ranges from yellow through clear reddish tints to brown and grey. The sole is pale creamy yellow and the lineolations of the fringe do not extend into the lateral areas of the sole in the yellow and red varieties. The fringe is bright orange or red. No external differences other than coloration have been noted, and diagnosis depends on the genital features to be described, the mating process, and the characters of the newly hatched young, with possibly a little help from the spermatophores and the radulæ. Yellow, red, and brown individuals occur in the same population.

Though it is true that with typical examples described above no mistake is likely to be made, with others there is difficulty. For example, reddish and brown *ater* with pale soles and coloured fringes which are less bright than those of *rufus* occur on a railway embankment at Thorpe, Norfolk, and black *rufus* with dark soles and black or dull yellowish-brown fringes occur on the Gower cliffs near Swansea, and at Cambridge, see Tables 1 and 2. In such cases the diagnosis depends on dissection.

Figs. 1 and 2 show the distal parts of the genital ducts of *A. rufus*, and Figs. 3 and 4 those of *A. ater*. What strikes one at first is the difference in bulk of the atria, which is greater than a flat sketch can convey. The lower atrium in both species is yellow with a dull slightly rough surface and is separated from the white smooth upper atrium by a slight constriction externally and a thin circular ridge within. In *rufus* the oviduct enters the large upper atrium slightly to the right of the centre and below the apex which bulges towards the left forming a well-marked lateral pouch that lodges the ligula. The free oviduct is ensheathed by the retractor muscle which arises from the diaphragm just behind the kidney close to the left cephalic retractor. It sends a branch to the neck of the sphermatheca duct. The oviduct enters a large folded tongue or cone-shaped structure, the sucker or ligula which conceals its orifice. The base and sides of the ligula are attached to the wall of the upper atrium and its tip is free. The spermatheca duct enters the atrium on the right side below the entry of the epiphallus. The sac is large, thin walled and distended by flocculent reddish-brown fluid and is connected by fibrous tissue with the spermoviduct. The vas deferens is of uniform diameter, variously coiled, and in *rufus* about one and a half times or even twice as long as the epiphallus. The distal end of the epiphallus has a thickened collar at its entrance to the atrium on the right side above the spermatheca duct. In Figs. 2 and 3 the vas deferens is shown disentangled from the spermatheca duct.

In *A. ater*, Figs. 3 and 4, the upper atrium is shorter than the lower one, and both are conspicuously smaller than in *rufus*. The oviduct enters the upper atrium centrally at its apex, and the lateral pouch is absent or small. The ligula is much smaller than in *rufus* and the vas deferens is less than one and a half times as long as the epiphallus, sometimes barely exceeding it in length. In Figs. 2 and 3 the retractor muscle is omitted. In the undisturbed position of the parts the epiphallus is curved around behind the atria, and its apex lies near the junction of lower and upper atrium on the left side. In the figures it is shown disentangled from the other organs. Fig. 18 shows the everted organs in a spirit specimen, and therefore shrunken. The ligula is above with the orifice of the oviduct in its lower margin, and the everted epiphallus below will be seen to form an efficient intromittent organ. The orifice of the spermatheca duct is immediately behind the epiphallus with the spermatophore of the partner protruding from it. From some localities, e.g. Limeslade Bay, Swansea, Fig. 2, the atria in *rufus* are more elongated, and sometimes in *ater* there is a small lateral pouch, Fig. 4. Taking these four characters together, viz. the bulk and relative size of the atria, the insertion of the oviduct, the size of the ligula, and the length of the vas deferens there can rarely be doubt as to the diagnosis. Fig. 6 shows the immature organs of *ater* in a slug about half grown. The free oviduct is relatively longer than in the adult, and the upper atrium rather unexpectedly shows a conspicuous lateral pouch like adult *rufus*. The spermatheca duct shows a slight enlargement towards its distal end. The retractor muscle ensheathing the oviduct and its branch to the neck of the spermatheca is relatively very large. The immature *rufus* organs also show the lateral pouch which here is retained to maturity, Fig. 5.

It has been possible to confirm Gerhardt's observations on the mating process. A pair of *A. rufus*, one grey and one dark brown, was seen feeding on sliced carrot at 9.30 p.m. on 10th September, 1944. At 10 p.m. they were encircled with the necks near together and showing a small protrusion of the yellow lower atria about the size of a pea, so the phrase of following and licking could not have occupied more than half an hour. At 10.10 p.m. the protrusions enlarged and the large translucent bluish-white upper atria were everted, and the animals snapped at each others' heads and licked mucus. At 10.20 p.m. the masses were fully everted and closely adherent, the thin yellow line of junction like the seams of a tennis ball, Fig. 7. The orifices of the oviduct, epiphallus, and spermatheca duct were completely concealed, and the conjoined masses were featureless except for the seam. At 11.10 p.m. the animals were quite still, and remained so except for occasional slight movements and lickings, until 12.5 a.m. The tentacles were slightly everted, and the respiratory orifice widely open and cardiac pulsations visible beneath the mantle. At 12.15 a.m. they separated, and spermatophores were momentarily visible protruding from the spermatheca ducts. The huge masses rapidly shrank and were completely withdrawn in a few seconds. Actual coitus therefore lasted for two hours. Sometimes the masses are elongated, Fig. 8, and sometimes partially hidden by slow movements of the animals. When mating is observed out of doors the animals are not under cover as is the case in *A. hortensis*, but on the grass or on the flagstones of a path. After two or three matings the pairs were dissected and exchanged spermatophores found in the spermatheca sac and duct of each. Once the spermatophore lay with one end in the sac as usual and the other just within the oviduct, but this was probably merely accidental. The spermatheca is distended with reddish fluid before coitus and there is no correlation between the shape of the sac and the shape of the spermatophore. Incomplete and abortive attempts at mating are sometimes seen and then no spermatophores are found either in the epiphallus or sac. If an animal is preserved and dissected soon after full eversion and adherence of the atria, a mass of sperms not yet enclosed in a spermatophore is found in the epiphallus, and a few hours after coitus the chitinous spermatophore is found to be disintegrated in the spermatheca and only isolated fragments are seen. It is therefore a very transient structure and so is seldom found in preserved material. As it is about 25 mm. long and the epiphallus is only about 12 mm. the spermatophore must be secreted and moulded around the sperm mass while it is passing through the epiphallus unless the latter is greatly stretched during coitus.

A mating of *A. ater* was seen at Capel-y-ffin, Brecknock, on 6th June, 1946. A pair of black individuals was found on the mountainside at 10 p.m., one following the other and licking the caudal mucus. They were brought indoors and at 10.20 p.m. were encircled, but the atria were not everted yet. When next observed at 11 p.m. the atria were fully everted, translucent bluish-white and rather less voluminous than in *rufus*, but in other respects just the same, but were considerably hidden from above by the closely approximated heads. At 11.30 p.m. the pair separated. The mating was complete because subsequent dissection revealed the exchanged spermatophores in the spermatheca sacs and ducts. Actual coitus could hardly have started before 10.30 p.m. and could not have lasted more than one hour, and probably was considerably less than this. This is the only *ater* mating observed.

The spermatophore of *A. rufus* is a very delicate chitinous sheath about 25 mm. long and is slightly swollen behind the middle and is narrowed at both ends. There is a finely serrated ridge running nearly its whole length. The anterior end is smoothly pointed and the posterior extremity ends in a twisted tag of chitin. Fig. 9 shows a few of the serrations near the centre of its length. At the extreme anterior end the ridge is wavy and the serrations point backwards, but further back, after a few intermediate teeth, they point forwards and so do not themselves facilitate its transit. The serrations are much smaller and more numerous than Moquin-Tandon's figure copied in Taylor's Monograph indicates. Possibly the serrations serve to hold the spermatophore steady while contractions of the spermatheca and its duct cause the longitudinal rupture that occurs in the line of the ridge. The length of the spermatophore and the epiphallus varies; in one case of a mated pair the spermatophore was 23 mm. and the epiphallus of the partner 13·5 mm., while the other spermatophore was 30 mm. and the partner's epiphallus 12 mm. In the only pair of spermatophores obtained from *A. ater* the length of one spermatophore was 18 mm. and the partner's epiphallus 14 mm., and the length of the other 17 mm. and the partner's epiphallus 11 mm., Fig. 12. In both these spermatophores the undulations of the ridge at the extreme anterior end were closer together than in *rufus*, Fig. 14. Further back the serrations, Fig. 11, are relatively larger than those of *rufus* and their edge is more irregular as if eroded. In the absence of further specimens from *ater* it is hardly possible to say whether some or all of these differences are characteristic or accidental. The spermatophore is of the same type as in *A. subfuscus* Drap. and very different from *A. hortensis* Fér. Quick, 1933 (7).

The radula in both species when flattened out measures about 7 mm. × 3·4 mm. and has about 130 rows of teeth, the rows being nearly horizontal. The central tooth varies in both species from 0·07 mm. × 0·038 mm. to 0·058 mm. × 0·035 mm. On each side there are about twenty lateral teeth and about forty aculeate marginal teeth, Figs. 21 and 22. The transition is indefinite and may be somewhere between the seventeenth and twenty-second tooth. Taylor states that the lateral teeth sometimes have an endocone, but none of the present material has shown one, and Oekland says that it is not present in Norwegian *ater*. The marginal teeth become gradually longer and narrower and then shorten again towards the edge of the radula, and four or five of the extreme marginals are much smaller. The mesocones of the marginals become relatively longer compared with the whole tooth except near the edge of the radula, and point towards the middle line and not outwards as figured in Taylor. Generally in both species the ectocone which is prominent in the lateral teeth, practically disappears after the first two or three marginals, to reappear towards the end of the series where it gradually descends from its normal position and in the outermost teeth arises from the mesocone. There is on the whole a tendency for the ectocones of the central teeth to be a little more curved backwards in *rufus* and a little more splayed outwards in *ater*, but sometimes the difference is negligible. The length of the mesocones of the marginal teeth varies even in slugs from the same site, and sometimes in both *ater* and *rufus* it is slightly curved, and was so in a Swedish example. Fig. 23.

The arcuate jaw in both species is about 3 mm. across, Fig. 19, pale yellow in yellow slugs and of varying shades of brown to black in dark individuals. It is crossed by a number of ribs which denticulate its lower margin, and vary in number and width and the way they are subdivided. On emergence from the egg the jaw is a miniature of the adult jaw, and shows no sign of a bilateral origin like the juvenile jaw of *Limax*, *Agriolimax*, and *Vitrina*, Fig. 20.

Before mating the albumen gland is very small even in full grown individuals, and may be only 4 mm. or 5 mm. long, but after mating and before egg laying it becomes enormous, reaching from the neck region nearly to the end of the visceral cavity, compressing the other organs. In an individual denied the opportunity of mating, however, it also becomes very large, and as is well known, self-fertilization readily occurs in *Arion* with the production of numerous eggs.

Arion ater and *rufus* are annuals. The former reaches maturity and lays between June and late September, and the latter from August to late October or November, and they die a few weeks later. In old age they rasp the skin of their companions, and may reach the viscera, thus hastening their death. The attacked slug makes no effort to escape or retaliate, and sometimes one will even gnaw its own tail. Exceptionally they may live much longer, and H. Watson has reared two slugs that reached nearly two years of age, and I have reared one to over eighteen months. The ellipsoidal eggs measure about 5 mm. × 4 mm. and at first are pearly white, but the leathery capsules become yellowish brown before they hatch, which occurs in from four to six weeks.

The newly hatched young are about 10 mm. long. In *A. ater* they are at first nearly white in some races, and straw coloured or pale orange in others. The head and tentacles are grey or sometimes violet, and soon become darker. In orange young the pigment is concentrated in the tubercles leaving the furrows clear, and there are no lateral bands. Sometimes faint mantle and body bands develop in the first few weeks and then die away again. The black pigmentation starts in two or three weeks in some races, and in others it is delayed longer. It starts in the furrows of the back and gradually spreads down the sides, though in the adult it is more concentrated in the tubercles leaving the furrows clearer. The sole is the last to pigment. In var. *albo-lateralis* Roebuck the pigmentation only extends half-way down the sides.

In *A. rufus*, Fig. 16, the young are pale yellow or orange at first and show brown mantle and body bands from birth or within a few days. Some individuals remain yellow or red, and the bands fade after a few months, but in those that become dark brown or black the black pigment starts in the same way as in *ater*. I have only once seen a brood of *rufus* that contained both banded and unbanded young (from a yellowish red parent) in the proportion of about 75 per cent banded and 25 per cent unbanded. When the slugs are about 25 mm. long, with the retention of bands and the commencement of dark dorsal pigmentation they closely resemble *A. subfuscus* Drap. of the same size, Figs. 16 and 17. They can be distinguished, however, because the anterior ends of the mantle bands are closer together in *rufus* than in *subfuscus* and the body bands are higher up on the sides. The var. *reticulata* Roebuck is one that retains these juvenile markings into later life.

After becoming nearly full grown both *ater* and *rufus* exhibit a rolling reflex. If touched once or twice when fully or nearly fully contracted, they will frequently but not always begin a rolling motion from side to side, compounded of rotation about the antero-posterior axis and a curving of the body alternately to right and left. Generally the movement is moderate, but occasionally quite violent. It is tempting to associate this reflex with the separate right and left origin of the cephalic retractor muscles in *Arion*, but the reflex has not been noted in the other species, though more careful tests might reveal it.

There seems little doubt that these two forms occurring in Britain should be regarded as two species. The difference in the genital organs is at least as great as that separating other slugs regarded as good species, and in addition to this there is the physiological difference in mating habit, the average difference in the season of maturity and the characters of the young. It has not been proved that typical examples of each cannot cross and produce viable young, and in view of the chances of failing to see the mating of a pair kept together, and the well known capacity to produce viable self-fertilized eggs, this proof would be difficult. Many examples are now known of nearly related pairs of both animals and plants that have a wider or narrower zone where their territories adjoin, in which intermediaries are found, and this may be due sometimes to hybridization and sometimes to adaptation of one or both forms to the ecological conditions of the other's habitat or to the direct influence of the ecological conditions, Huxley, 1942 (11). These considerations may explain the atypical forms sometimes found, e.g. the coloured *ater* from Thorpe, Norfolk, and the black *rufus* from Limeslade Bay and from Cambridge, see Tables 1 and 2. The tables also incidentally show something of the distribution of the two species as far as is known at present. Survey of a strip of territory extending from a known moorland habitat of *ater* to a warm calcareous site for *rufus* would be of great interest. Present records do suggest that the atypical examples occur in sites of intermediate character.

As to nomenclature, *Arion ater* (L.) can certainly stand for the one that is typically black and inhabits mountains, moors, and fens, and its rarer coloured varieties. Linné's *Systema Naturæ*, 10th edition, 1758, p. 652, gives *Limax ater* and implies by reference to older authors that it is " tota nigra ". On the same page we find *Limax rufus* and by similar references he implies that it is " magna, colore rufo " and synonymous with Lister's *subrufus*. In the 1788 edition edited by Gmelin, *Limax rufus* is omitted as a species, but five varieties of *ater* are mentioned, viz. α identified with *ater* of the 1758 edition, β pale green dorsally, γ with white sole and yellow fringe, δ brown with white sole and yellow fringe, ϵ obscurely brown with yellow lineolated fringe. Now γ, δ, and ϵ could easily refer to our second species, especially as he refers to the first two occurring in wild places and the latter three as " rariores in hortis ". In this connection it should be noted that Oekland 1922 (3) mentions *A. ater* var *rufus* as having been found occasionally in parks between 1853 and 1890, and therefore supposed to have been introduced. Oekland also refers to var. *marginella* Schranck 1803 (8), black with yellow or red fringe, as rare and not recorded for fifty years, but gives references to older Norwegian collectors. Dr. Nils Odhner writes that he only knows of the large yellow form from Borgholm, Oeland Island, and suggests that it might have been introduced there when Castle Solliden was built in 1906, because Linné does not mention it in *Iter Oelandicum*, 1745, and neither does Westerlund who visited the island about 1865, and also

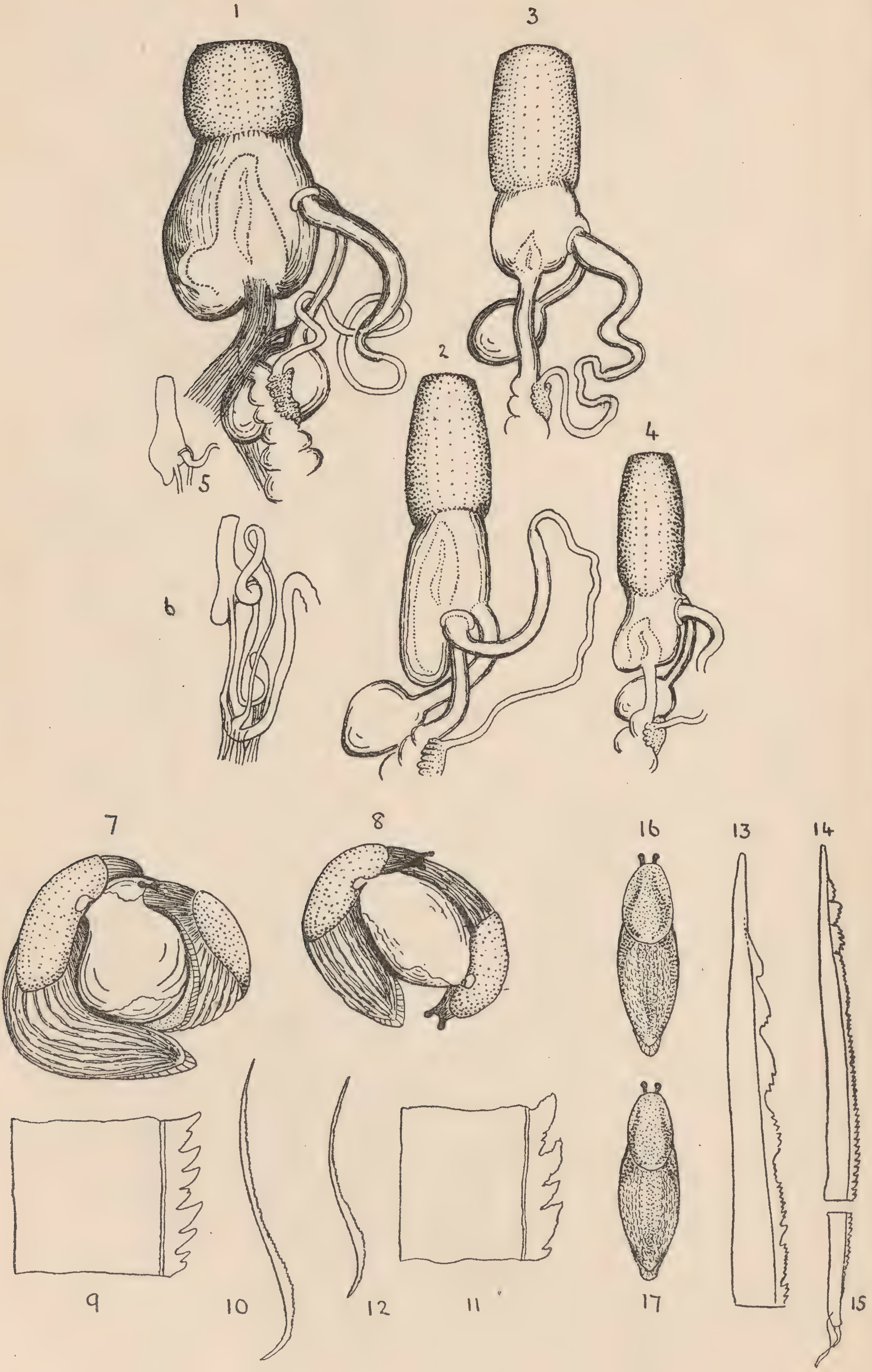
SUMMARY OF DATA

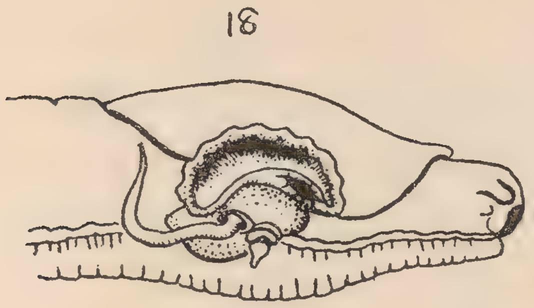
TABLE 1

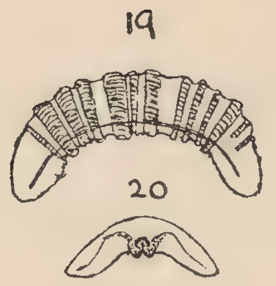
Site and Date	General	U = upper atrium in mm. L = lower atrium in mm.	V = vas deferens in mm. E = epiphallus in mm.	Ligula	Habitat	Diagnosis
Llanwrtyd Wells, Brecknock, 7.10.44	10 cm., black, with black soles and black fringes. Young very pale yellow, bandless	(*a*) U. 4 L. 7 (*b*) U. 4·5 L. 6·5 (*c*) U. 4 L. 7	V. 16 E. 12 V. 14 E. 12 V. 14 E. 11	Small Small Small	Grassy mountain	*ater*
Cefn Bryn, Gower, Glamorgan, 20.9.44	10 cm., black with dark grey soles and smoky brown fringes. Young faintly and transiently banded	U. 4·5 L. 7·5	V. 13 E. 12	Small	Sphagnum bog	*ater*
Ide, Devon, 4.10.44	11 cm., brown, with grey brown sole and brown fringe	U. 4 L. 5	V. 14 E. 10	Small	Waste ground	*ater*
Abersoch, Carnarvon, 28.8.35	Spirit specimen var. *albo-lateralis* Roebuck	U. 4·5 L. 6·5	V. 10 E. 12	Small	Grassy mountain	*ater*
Wheatfen Broad, Norfolk, 29.9.44	12 cm., black, with dark grey sole	U. 4·5 L. 6·5	V. 10 E. 10	Medium	Fen	*ater*
Brundall Marsh, Norfolk, 29.9.44	14 cm., dark brown with brown sole and fringe	U. 4·5 L. 5·5	V. 10 E. 10	Medium	Fen	*ater*
Capel-y-ffin, Brecknock, 6.6.46	11 cm., black, sole dark grey, fringe black	U. 5 L. 4	V. 13 E. 10	Very small	Grassy mountain, with much boggy ground	*ater*
Pentland Hills, Scotland, 7.7.46	11 cm., black, with very dark grey sole and black fringe	U. 4 L. 4	V. 16 E. 10	Small	Boggy ground with rushes on hillside	*ater*
Thorpe, Norfolk, 27.8.46	12 cm., dark brown, dull red, and yellowish brown, the lighter ones with pale creamy soles not lineolated. Young yellow, unbanded	(*a*) U. 6 L. 4 (*b*) U. 5·5 L. 4·5	V. 19 E. 10 V. 10 E. 10	Medium Small	Railway embankment. A variable population, in some characters approaching *rufus*	*ater*
Llangennith, Gower, Glamorgan, 30.9.46	11 cm., black, with black sole and fringe. Young very pale yellow, unbanded. Black pigment developed early	U. 4 L. 5	V. 11 E. 12	Small	Marsh behind sand dunes	*ater*

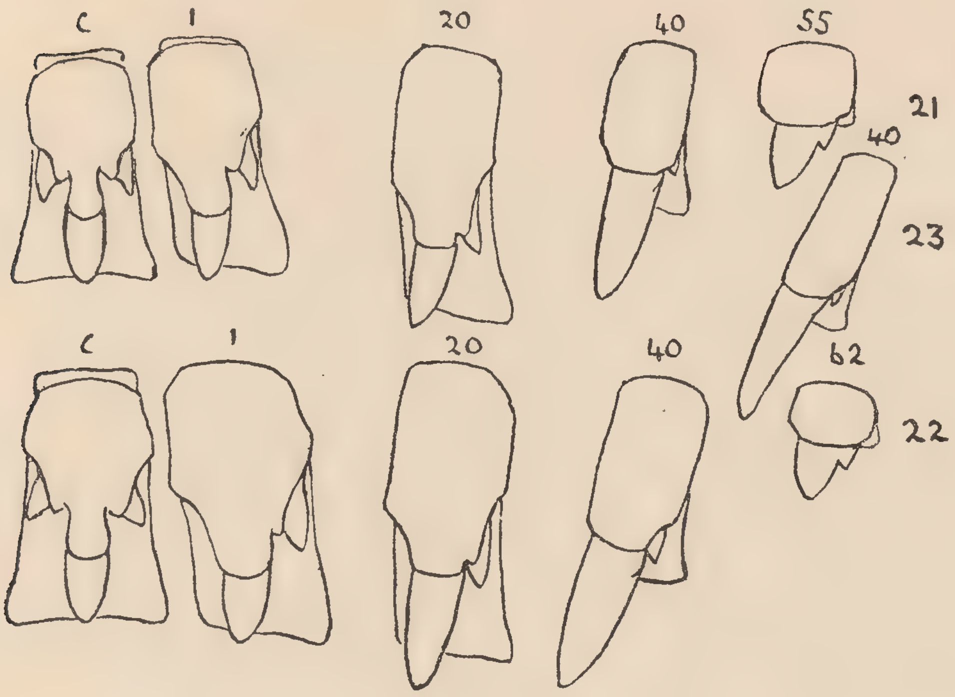
TABLE 2

Site and Date	General	U = upper atrium in mm. L = lower atrium in mm.	V = vas deferens in mm. E = epiphallus in mm.	Ligula	Habitat	Diagnosis
Swansea, Glamorgan, 3.10.44	14 cm., grey, brown, clear red, and yellow. All have pale creamy soles, the lighter coloured specimens without lineolations. All have bright orange or red fringes. Young with well marked dark brown bands at birth	(*a*) U. 10 L. 8 (*b*) U. 12 L. 6 (*c*) U. 8 L. 6	V. 20 E. 12 V. 24 E. 11 V. 22 E. 12	Large Large Large	Garden of 130 Eaton Crescent, Swansea. Boulder clay, loamy soil with added lime. Herbaceous borders, rockery, etc.	*rufus*
Blackpill, Swansea, 10.9.44	14 cm., grey and brown, soles pale cream to light brown, fringes orange	(*a*) U. 7 L. 4 (*b*) U. 7 L. 4 (*c*) U. 8 L. 4	V. 22 E. 12 V. 21 E. 11 V. 19 E. 13	Large Large Large	Base of hedgerow near cottages	*rufus*
Limeslade Bay, Swansea, 11.9.45	13 cm., black, with dark grey soles and black fringe. A few animals very dark brown, with lighter brown fringe	(*a*) U. 8 L. 7 (*b*) U. 7 L. 4	V. 20 E. 11 V. 27 E. 14	Large Large	Short turf on limestone cliff	*rufus*
Willingham, Cambridge, 13.9.45	15 cm., black, with very dark sole and black fringe	U. 9 L. 4	V. 23 E. 14	Large	Footpath of the Lord's Meadow, 30.5.45, and nearly full grown. An example that could be mistaken for *ater* from external features	*rufus*
Borgholm, Oeland Island, Sweden, 30.8.46	Spirit specimens, very large. Light brownish yellow, sole pale, not lineolated, fringe orange	U. 6·5 L. 4	V. 20 E. 10	Large	The gardens of Castle Solliden	*rufus*









because Schlesch (*Archiv. fur Molluskenkunde*, 1937) did find it at Borgholm, but only in the park in 1935. Westerlund (*Synopsis Moll. extramarin. Scand.*, 1897) believed that because he did not find *rufus* in Sweden therefore Linné's *rufus* of 1758 must have been identical with *subfuscus* Drap. It is difficult to follow the grounds for this assumption; it surely does not follow that Linné did not know *rufus* from elsewhere and even from Scandinavia, and he mentions coloured forms with white soles and bright fringes, and describes them as "Limax magna, colore rufo", which could hardly be a description of *subfuscus* Drap., so that even if *rufus* was introduced into Norway and Sweden in recent historical times it seems reasonable to suppose that it was there in Linné's day. Another name to be considered is *A. empiricorum* Férussac, 1821 (9). Férussac identifies his *empiricorum* var. α with Lister's *ater*, which Linné identifies with his *ater*, and describes it as "aterrimus totus, vel brunneus". Férussac's var β he identifies with var. β of Müller and Linné, var. γ is black with red or yellow fringe, var. δ blackish with red or yellow fringe, var. ε is dull red with yellow or red fringe, and he mentions two or three other varieties which he identifies with Lister's *subrufus* which is Linné's *rufus*. Thus Férussac's *empiricorum* confessedly includes both of Linné's species. He gives as habitat the whole of Europe, from Iceland to Italy and Spain, so *empiricorum* includes *ater* and *rufus* and perhaps other species such as *lusitanicus* Mabille, as well. Moquin-Tandon, 1885 (10), identifies his *rufus* with Férussac's *empiricorum* and with Linné's *ater* and *rufus*. As the question can never be unequivocably cleared up by the examination of preserved type specimens, there seems to be no valid reason for not reverting to the two Linnean names, especially as it has now been confirmed that the second British species does also occur in Sweden.

In conclusion I have to thank Rev. J. H. Adams, Dr. H. F. Barnes, Dr. W. E. Collinge, Capt. M. J. H. Cockle, Mr. A. E. Ellis, Mr. E. A. Ellis, Mr. C. Matheson, Dr. Nils Odhner, Mr. D. C. Thomas, and Mr. H. Watson for kindly sending preserved or living specimens and helping with references.

EXPLANATION OF FIGURES

FIG. 1.—*Arion rufus* L. Swansea garden. Distal part of genital ducts, × 2·5.

FIG. 2.—*Arion rufus* L. Limeslade Bay. Distal part of genital ducts, × 2·5.

FIG. 3.—*Arion ater* L. Llanwrtyd Wells. Distal part of genital ducts, × 2·5.

FIG. 4.—*Arion ater* L. Cefn Bryn, Gower, Glamorgan. Distal part of genital ducts, × 2·5.

FIG. 5.—*Arion rufus* L. Swansea garden. Ducts of immature example, × 4·5.

FIG. 6.—*Arion ater* L. Llanwrtyd Wells. Ducts of immature example, × 4·5.

FIG. 7.—*Arion rufus* L. Swansea. In coitus.

FIG. 8.—*Arion rufus* L. Swansea. In coitus.

FIG. 9.—*Arion rufus* L. Swansea. Central portion of spermatophore, × 25.

FIG. 10.—*Arion rufus* L. Swansea. Spermatophore, × 1·5.

FIG. 11.—*Arion ater* L. Capel-y-Ffin, Brecknock. Central portion of spermatophore, × 25.

FIG. 12.—*Arion ater* L. Capel-y-Ffin, Brecknock. Spermatophore, × 1·5.

FIG. 13.—*Arion rufus* L. Swansea. Spermatophore, anterior end, × 5.

FIG. 14.—*Arion ater* L. Capel-y-Ffin, Brecknock. Spermatophore, anterior end, × 5.

FIG. 15.—*Arion ater* L. Capel-y-Ffin, Brecknock. Spermatophore, posterior end, × 5.

FIG. 16.—*Arion rufus* L. Swansea. A few weeks old, × 2.

FIG. 17.—*Arion subfuscus* Drap. Swansea. A few weeks old, × 2.

FIG. 18.—*Arion rufus* L. Swansea. Spirit specimen with genitalia everted and spermatophore in the spermatheca duct, × ·75.

FIG. 19.—*Arion rufus* L. Swansea. Jaw, × 5.

FIG. 20.—*Agriolimax reticulatus* Mull. Juvenile jaw, × 25.

FIG. 21.—*Arion rufus* L. Swansea. Radular teeth, × 250.

FIG. 22.—*Arion ater* L. Llanwrtyd Wells. Radular teeth, × 250.

FIG. 23.—*Arion rufus* L. Borgholm, Sweden. Occasionally similarly curved marginal teeth occur in British *rufus* and *ater*, × 250.

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Aplexa hypnorum (Linn.) in Bedfordshire.—I have always hunted for this species since, according to the map in Professor Boycott's paper " The Habitats of the Freshwater Mollusca in Britain " (1936, *J. Anim. Ecol.* **5**, 154), Bedfordshire is one of the few inland counties from which the species has not been recorded. I detected the first county specimen in a small aquarium of Bedfordshire water plants exhibited by Dr. J. G. Dony. I obtained from him a list of localities from which the plants had come and systematically investigated these, but without results. However, on 30th March, 1946, I found two specimens at Totternhoe, in a very damp meadow bordering the River Ouzel. It is crossed by numerous shallow streamlets which during the early part of the year are swollen into very shallow ditches. The only two specimens of *Aplexa* which I could find were floating in a " hoof hole " on the mud verge of one of the streamlets. *Lymnæa truncatula* and *L. peregra* were the only other aquatic molluscs present in the immediate vicinity. *Arianta arbustorum* was remarkably abundant on the banks of all the streamlets and often nearly submerged. The young of this species were plentiful at the roots of Junci. Later in the year the majority of these streams dry up completely. During the autumn the meadow is remarkable for the vast numbers of *Helicella virgata*.

A microscopical investigation of the contents of the rectum of the *Aplexa* showed that only a small part of the food consisted of vascular plants. It appeared to be mainly algæ.

B. Verdcourt.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN AND IRELAND.

The 678th (70th Annual) Meeting held at the British Museum (Nat. Hist.), London, on Saturday, 2nd November, 1946.

There were present :—

The President, Dr. A. T. Hopwood, in the chair.

Lieut.-Col. Bensley, Mrs. McMillan, Mrs. Morehouse, Messrs. Blok, Castell, Davey, Ellis, Gardiner, Pain, Salisbury, Stratton, F. Taylor, Tomlin, and Wilkins.

Visitors : Mrs. Davey, Mrs. Pain.

The Minutes of the previous Annual Meeting having been published already were taken as read and adopted.

Election of Scrutineers.

Messrs. Blok and Davey were elected Scrutineers.

Election of Auditors.

Dr. Hopwood and Mr. Castell were elected Auditors for the year.

Election of Members.

The following were elected to membership of the Society :—

Giles Galley, The Vicarage, St. Neots, Hunts.
Miss Mavis Holloway, 32 Pentland Avenue, Mount Eden, Auckland, N.Z.
G. Mandahl-Barth, M.Sc., Danmarks Akvarium, Charlottenlund, Denmark.
S. Feliksiate, Ph.D., Director Polish Museum Zoology, Warsaw, Poland.
T. Pain, 71 Gower Street, London, W.C. 1.
G. H. Pavey Smith, Hollies, Nailsworth, Gloucestershire.

Candidates for Membership.

Robert Sterling Newall, F.S.A., Fisherton Delamere House, Wylye, Wilts. Sponsors : A. S. Kennard and N. F. McMillan.

Miss L. E. Wagge, B.Sc., King's College, Strand, London, W.C. 2. Sponsors : A. Comfort and A. T. Hopwood.

The President announced that at a meeting of the Council held previous to this meeting Mrs. McMillan was nominated for the office of Librarian vice Mr. C. H. Moore, resigned.

Reports.

Reports were received and adopted from the North Staffordshire Branch and the Yorkshire Branch.

The Marine Recorder made a report relative to records received and appealed for records of what members might look upon as trivial matters.

The Treasurer then made a statement of accounts. The published accounts were taken as read and the Treasurer said that the position of finance was improving and that members were adopting the new rate of subscription.

The Scrutineers then made their return and the President announced that the Officers and Council had been elected as published on the ballot papers with the addition of Mrs. McMillan as Librarian.

The President then delivered his address entitled : " British Snails Abroad."

A vote of thanks for the address was passed with acclamation.

Exhibits.

By Lieut.-Col. Bensley : Boring Mollusca from Jersey.

By Mr. A. E. Salisbury : British Eulimidæ.

By Mr. A. W. Stelfox : a ten days' old *Geomalacus* from parents taken in a new locality north of Connor Pass, Dingle, Kerry.

By Mr. T. Pain : specimens illustrating shell erosion in tropical freshwater mollusca.

By Mr. L. W. Stratton: *Lymnæa stagnalis* illustrating erosion; malformed *Anodonta cygnea* and *Unio pictorum* from Essex.

By Mr. D. C. Thomas: series of living *Agriolimax caruanæ* Pollonera with maps showing the spread of the slug on the farm at Seale-Hayne Agricultural College, Newton Abbot, Devon.

Mr. A. P. Gardiner: Chitons from a pool at Marazion, Cornwall; shells from Oban; also specimens illustrative of association.

By Mrs. Morehouse: Land Operculates, including *Chondrothyra, Colobostylus, Ostodes*, and *Blæsospira echinus* Wright: also Achatinellidæ.

By Mr. J. R. le B. Tomlin: sinistral *H. aspersa*: dextral *Clausilia rugosa* from Skipton, *C. biplicata* from Cambridge, and *C. cravenensis* from Ingleton: sinistral *Vallonia pulchella* from Poland: new species of *Voluta* trawled in 120 fathoms S.E. of Cape Recife, S. Africa: sinistral *H. arbustorum*: sinistral *H. ericetorum* from Bundoran: *H. nemoralis* subfossil from Dog's Bay, Connemara; with mouths extended after maturity from Bundoran: a large example 30 mm. in diameter from Galway, and small ones 14·5 mm. from Llanrhidian marsh, Gower.

ANNUAL REPORT

This is the 70th Annual Report of the Council. In August last the membership totalled 174. Two parts of the *Journal*, nos. 8 and 9, have been issued since the last Report.

The Trustees of the British Museum have granted permission for meetings to be held in the Board Room of the British Museum (Natural History) during the first part of the coming session.

Marine Recorder's Report.

An addition to the British fauna is *Janthina planospirata* Ad. & Reeve, taken in large numbers at Sennen by Mr. W. Fowler (see *supra* p. 186, plate i). Other rare species include *Ammonicera tricarinata* Webster taken by weed washing (Fowler): *Jordanula nivosa* Mtg., Teignmouth, in 5 fathoms: *Cardium papillosum* Poli from Falmouth, Guernsey, Scilly, and from Tunis.

The following associations of mollusca are of great interest:—

With Crustacean *Axinus stirynchus* Leach, about one mile below high water mark, Jersey. *Galeodina carinata* (da Costa), *Chauvetia brunnea* (Donovan), *Rissoa lactea* (Michaud), *Tornus subcarinatus* (Montagu), found in the burrows under large stones.

At Salcombe

Association of *Lepton squamosum* Montagu with the Crustaceans *Upogebia stellata* and *deltusa* (Zostera zone).

Association of Hermit crabs in dead shells and sponges with the Anemones *Adamsia palliata* and *rondeletii* and the worm *Nereis fucata*; and of the Hydrozoon *Hydractinia* with living shells and those inhabited by Hermit crabs.

Association of the worm *Phascolion strombi* L. in old shells with the molluscs (not as yet found in the British area) *Odostomia perezi* D. & F. and *Montacuta phascolionis* D. & F.

Association of the Chordate, *Ascidia rubicunda* with *Modiolaria marmorata* Fbs. and *Lamellaria perspicua* L. and *latens* (Müller).

Association of the Echinoderm *Ophiocnida brachiata* and of the worms *Amphitrite johnstoni* Mgrn. and *edwardsii* Mgrn. and *Arenicola marina* with the mollusc *Mysella bidentata* Montagu.

Association of the Echinoderm *Leptosynapta inhærens* with the mollusc *Devonia perrieri* (Malard). Zostera zone.

Association of *Echinocardium cordatum* with the mollusc *Montacuta ferruginosa* (Montagu).

Association of the *Whale* with the Crustacean *Coronella* and *Adula simpsoni* Marshall.

Dr. Comfort has reported a large number of species from Irish stations, most of them of wide distribution, but frequently lacking definite records. The following may be specially mentioned : *Gibbula tumida*, *Lacuna vincta* and *crassior*, *Potamopyrgus jenkinsi*, *Cingula fulgida*, *Rissoa grossa* and *membranacea*, *Triphora perversa*, *Cirsotrema commutatum*, *Natica p. grœnlandica*, *Trophonopsis truncatus*, *Velutina velutina*, *Lamellaria perspicua*, *Mytilus galloprovincialis*, *Modiolus barbatus*, *Cardium exiguum*, *Dosinia lincta*, *Mysia undata*, *Abra tenuis*, *Gari fervensis*, *Mya truncata*, *Cochlodesma prætenue*, *Thracia distorta*.

Shells from Zostera at Selsey sent me many years ago by Miss K. White prove to be *Paludinella littorina globularis*.

ANNUAL REPORT OF THE YORKSHIRE CONCHOLOGICAL SOCIETY.

(A BRANCH OF THE CONCHOLOGICAL SOCIETY OF GT. BRITAIN AND IRELAND.)

The meeting arranged for 4th March was duly held, the primary object being the exhibition of Clausiliidæ. The response by Mr. H. J. Armstrong, Mr. J. H. Lumb, Mrs. E. M. Morehouse, Mr. and Mrs. Thurgood was large and varied, and about 100 species were sent by Dr. Hans Schlesch, of Copenhagen.

Only six members turned up for the excursion to Collingham on 1st June, but the results were quite good, twenty-three species being taken or noted.

On 1st July the excursion to Ilkley was joint with the Y.N.U. The attendance was small. Mr. Lumb accounted for five species, Mrs. Morehouse for fifteen, and Mr. and Mrs. Thurgood for six.

On Saturday, 28th September, a special conversazione was held to commemorate the jubilee of the Society. Dr. J. Wilfrid Jackson, of Buxton, gave a most interesting address on " Yorkshire Conchology and its Founders ". The President (and oldest member of the Society), Mr. J. Digby Firth, was in the chair and gave a warm welcome to Dr. Jackson and to the delegates from kindred societies in Doncaster, Leeds, Halifax, York, and Bradford. There was a wide range of exhibits.

The membership of the Society is now twenty-three, and it is hoped this number may be increased for next year's activities.

W. Thurgood,
Hon. Sec.

ANNUAL REPORT OF THE NORTH STAFFORDSHIRE BRANCH.

I have not received any notes from members of this Branch and have only two of my own to report, viz. *Physa heterostropha* taken in the canal at Hanley, and several white *Arion ater* found under an uprooted tree in Weston Sprink, near Longton.

B. Bryan,
Hon. Sec.

Phytia myosotis (Drap.) in Flintshire.—Some years ago my friend Mr. Tomlin told me that he thought he had taken *Phytia* at Talacre, Point of Air, Flintshire, about fifty years ago. Recent visits have proved the accuracy of his memory, for I found the species frequent on the drier parts of the salt-marsh there. Much of the salt-marsh is a pure growth of *Obione portulacoides* and here *Phytia* appeared to be absent, but at a slightly higher level where a grass (? *Festuca*) was mixed with *Aster tripolium* and *Obione*, *Phytia* was at once abundant. In one place only did it occur in association with *Hydrobia ulvæ* ; as a rule the *H. ulvæ* habitat appeared to be too wet for *Phytia*.

N. F. McMillan.

ACCOUNTS FOR THE YEAR ENDING 31st DECEMBER, 1946.

Income and Expenditure Account.

Dr.

	£	s.	d.	£	s.	d.
To Annual Subscriptions—						
For 1946—	63	12	4			
Paid in 1945	6	7	6			
Arrears	30	19	4			
				100	19	2
,, Sales				17	16	3
,, Transfer from Life Membership Fund .				17	4	9
				£136	0	2

Cr.

	£	s.	d.	£	s.	d.	£	s.	d.
By Publication and Distribution—									
Vol. 22, pt. 7 .	37	9	8						
Do. Reprints .	4	19	6						
				42	9	2			
Vol. 22, pt. 8 .	46	4	6						
Do. Reprints .	9	13	7						
				55	18	1			
							98	7	3
,, Printing and Stationery							6	8	9
,, Fire Insurance								10	0
,, Subscriptions—									
Malacological Society .				1	1	0			
Lancs. Faunal Com. .					5	0			
Zool. Record . . .					8	0			
							1	14	0
,, Cheque Book								4	0
,, Officers' Expenses							6	18	3
,, Balance being excess of Income over Expenditure							21	17	11
							£136	0	2

Life Membership Fund.

	£	s.	d.
To Amount of Fund, 1st January, 1946 . .	361	10	0
,, Donations and Life Fees	87	16	0
,, Dividends and Interest	17	4	9
	£466	10	9

	£	s.	d.
By Transfer to Income and Expenditure Account	17	4	9
,, Amount of Fund, 31st December, 1946 .	449	6	0
	£466	10	9

Research Fund.

	£	s.	d.		£	s.	d.
To Amount of Fund, 1st January, 1946	271	4	7	By Amount of Fund, 31st December, 1946 (Capital)	200	0	0
,, Dividends and Interest	12	18	0	,, Accumulated Dividends and Interest	84	2	7
	£284	2	7		£284	2	7

BALANCE SHEET.

LIABILITIES.		£	s.	d.	ASSETS.		£	s.	d.
Annual Subscriptions in Advance		10	1	0	4% Funding Loan		350	0	0
Life Membership Fund		449	6	0	3% Defence Bonds		200	0	0
Research Fund		284	2	7	3½% War Loan		40	0	0
Transfer from Research Fund		100	0	0	Cash at Bankers—				
Balance Income and Expenditure Account—					National Provincial	104 11 9			
As on 1st January, 1946	169 15 10				Post Office Savings Bank	335 11 7			
For 1946	21 17 11				In hand	£5 0 0			
		191	13	9			445	3	4
		£1,035	3	4			£1,035	3	4

NOTE.—Assets in addition to those set out in the Balance Sheet are (*a*) Library, (*b*) Cabinets and Collections, (*c*) Stock of unsold publications, (*d*) Annual Subscriptions in arrears; but against this as a Liability is the cost of vol. xxii, part 9, of the *Journal* issued in December and for which the accounts (amounting to £51 17*s*. 8*d*.) were not received in time for the above statement.

Audited and found correct.
1st March, 1947.
A. TINDELL HOPWOOD.
C. P. CASTELL.

ALBERT E. SALISBURY,
Hon. Treasurer
31st December, 1946.

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HENRY A. PILSBRY,

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It is believed that students of the Mollusca will find material of value to them in these volumes, whether they are interested in species of the world, or in those of a local fauna.

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VOL. 22] 31ST DECEMBER, 1947. [No. 11

. . THE . .
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— OF —
CONCHOLOGY

FOUNDED 1874.

BEING THE ORGAN OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN AND IRELAND.

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And also of the Secretary of the Society.

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THE

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JANTHINA IN CORNWALL.

By T. G. W. FOWLER.

(*Read before the Society 22nd November, 1947.*)

It will be recalled that last year I recorded *Janthina planispirata* (A. Adams and Reeve) from Gwenver, Cornwall, as a species new to the British list (this *Journal*, *supra*, p. 186). This occurred in considerable numbers in January.

This year for seven successive days, 5th to 12th July, hundreds of *J. planispirata* and *J. britannica* F. & H. were washed up in Gwenver and Whitesand Bays, as well as six examples of *J. pallida* Harvey. With them came thousands of *Velella* and hundreds of bunches of *Lepas fascicularis*, up to 7 or 8 in a bunch, all living. Most of the *Janthina* were living with floats attached, but many of the shells were broken, to some extent no doubt by people walking along the tide lines. It was a difficult matter to forestall these collectors, and could only be partially effected by being on the shore before 8 a.m. Mr. R. H. Moses, of Tottenham, was also staying at Sennen at the time, and secured two specimens of the rare *J. pallida*. About three weeks later friends who were staying at the Lizard reported *J. planispirata* living from Pentreath Sands on 2nd August, and from Gue Graze nearer Mullion on 6th August. It seems very probable that *J. planispirata* has occurred here earlier than 1946, but has not been noticed by conchologists. Search at Porthcurno and in the eastern half of Mounts Bay on 10th July was made without result.

Enemies of Mollusca.—Specimens of *L. stagnalis* (Linn.) were devoured by water beetles (*Dytiscus marginalis*) while occupants of a large aquarium. The shells were completely cleaned by the insects.

A. S. COOK.

Heterostrophy in Spondylus.—The embryonic shell on the umbo shows the totally different sculpturing of young and adult.

A. S. COOK.

MOLLUSCA OF A TEMPORARY POND.

By N. F. McMillan.

(*Read before the Society 22nd November, 1947.*)

It is perhaps of interest to chronicle the molluscan fauna of a temporary pond. The pond in question is a shallow basin-shaped depression, 55–60 feet in diameter, and lies close to the stream called the Dibbin, at Bromborough, in the Wirral peninsula, Cheshire. The pond is separated from the Dibbin by a 4 ft. wide strip of land, but has no connection with the stream, and is apparently filled by rain-water alone. The hollow holds water for only a few months during the winter, and freezes on the slightest provocation. During late spring and summer it dries up altogether and is covered with vegetation. In 1947 it was already dry by April, when one could walk dryshod on the bottom of bare fissured mud. The mollusca could be zoned thus: in the dampest hollows *Lymnæa peregra* (Müller), *L. palustris* (Müller), and abundant *Aplexa hypnorum* (L.); a little higher up the sides of the hollow more *L. palustris* with *L. truncatula* (Müller). These in turn were succeeded by *Succinea pfeifferi* (Rossmässler) and a few *Zonitoides nitidus* (Müller) and *Agriolimax agrestis* (L.). Finally, in the nettle-belt which surrounds the hollow above the water-level were *Zua lubrica* (Müller), *Gonyodiscus rotundatus* (Müller), *Retinella nitidula* (Drap.), *Oxychilus alliarium* (Miller), *Arion ater* (L.), and *Trochulus hispidus* (L.), in addition to strays from lower zones.

By July the whole hollow was a pure growth of Water Pepper (*Polygonum Hydropiper* L.) extending to the winter water-level, above which were nettles.

As to the origin of the mollusca in the pond one can only guess; the Dibbin itself is innocent of any molluscs, probably due to pollution from filter-beds a little further upstream, and the nearest permanent habitat for fresh-water mollusca is a patch of marshy ground round a little spring about 300 feet distant from the pond. The ground is much trampled by cattle, and only holds *L. truncatula*, *Hydrobia jenkinsi* (Smith), and *Pisidium personatum* (Malm) now, although in 1938 *Aplexa* occurred, but had disappeared again by 1940 and has not been seen there since. *L. palustris* lives in a very dirty ditch several hundred yards away from the pond, but the nearest locality for *L. peregra* is some water-filled marl-pits only a few hundred yards distant as the crow flies, but separated by a main-line railway, the steep, wooded valley-side, and the polluted Dibbin.

Dr. Quick kindly determined the *Succinea* specimens, and Mr. Stelfox the *Pisidia* from the spring.

THE SPEED OF LAND MOLLUSCA.

By BERNARD VERDCOURT.

(*Read before the Society 22nd November, 1947.*)

THE snail's own motion must play quite a considerable part in dispersal, as well as the more rapid means (e.g. carriage by birds) which have occasionally been observed. The chances of the latter happening are relatively small and gradual extension of range is due to self motion. Other factors such as the " homing instinct " which has been attributed to certain species would tend to act against this. A species would slowly colonize all the suitable terrain until barriers of unsuitable ground were reached, when any further advance could only be effected by other means. One factor influencing the rate of dispersal by self motion is the actual speed of the animal. This, of course, is by no means a constant factor, depending on atmospheric conditions, nature of the surface, and internal state of the animal. The abundance of the food supply will, of course, play a considerable role. Snails will not need to leave those habitats which supply ample food. There is, however, no doubt a good deal of random movement besides that directed to finding food or a mate, depending on external stimuli. A few observations based on three species may be of some interest.

1. *Oxychilus helveticum* (BLUM).

Specimens of this were found actively moving on a grassy path one morning after a very rainy night (Boxmoor, Herts, 5th November, 1946). Species of this genus particularly *O. lucidum* (Drap.) though usually stated to be purely nocturnal, are often active on days following very rainy nights. The specimens collected were about two-thirds fully grown and were removed to laboratory conditions and allowed to crawl on paper. The temperature was 14° C. and the R.H. about 60 per cent. Timing was carried out over a large number of tracks whilst the animal was fully active. The average speed attained was 0·023 cm./sec., the maximum speed observed being 0·026. Further experiments to be carried out with the specimens at different humidities were curtailed since they retreated into their shells and would not come out at any humidity. The paths pursued were practically straight lines though this would doubtless rarely be the case in nature save over short distances when some particular object was sought. Slugs will travel in straight lines towards a fungus which they have smelt. Random deviations in course are due to reasons usually beyond human perception and coupled with the long periods of inactivity in the mollusc's yearly life, it is obvious that the actual distance travelled will bear only a very complex relationship to the speed of travel.

2. *Arion hortensis* (FÉR.).

A further set of timings was carried out with various sized specimens of this species varying in weight from 0·01 gm. to 0·1 gm. and in length (when fully extended) from 1·1 to 2·1 cm. Extended length is approximately linearly related to weight. Although insufficient experiments were carried out to make reliable statements the average speed does not appear to depend on the weight though the highest speed was attained by the largest slug. The same slug in other experiments travelled at speeds much below the maximum attained by the smallest individual. The actual speeds observed varied from 0·013 cm./sec. to 0·048 cm./sec. the average being 0·027. One would not really expect larger specimens to travel much faster than smaller ones of the same species since as size and muscular power increase so does resistance to motion, since, though frictional force is roughly independent of the normal reaction for lubricated surfaces, it is proportional to the area of the surfaces in contact, besides several other factors. This does not apply to different sized members of different species since some species are stronger than others and other factors such as the viscosity of the mucus will enter in.

3. *Helix* (*Cepæa*) *hortensis* (Müll.).

Experiments were carried out on several adult specimens of this species collected at Flitwick Moor in Bedfordshire. The average speed observed was 0·075 cm./sec., the maximum attained being 0·084 cm./sec. These few indications give a rough idea of the order of magnitude of the speed which land snails usually attain, viz. $\frac{1}{4}$ to $\frac{3}{4}$ mm. per second. Though snails are renowned for their slowness, no actual figures could be found in the literature. In fact few observations of this kind appear to have been made on any invertebrates. F. J. O'Rourke in a recent paper [1] has made some similar observations on ants and states that the average speed of a worker of *Tetramorium cæspitum* is $\frac{1}{3}$ cm. per second at 20° C. and mentions that doubling the temperature has been known to multiply the speed of an ant by ten. This is to be expected since metabolic processes in common with most chemical reactions follow the rough and ready rule beloved of physical chemists that a ten degree rise in temperature doubles the speed of the reaction. This is no doubt the case with the snail's metabolism but an increase in temperature dries up the moisture and thus counteracts any increased activity. Observations on snails which live in hot climates would be of interest.

It would therefore seem that snails move at speeds about 1/10th those of geophilic insects and that the larger the species the greater its speed, though it is not possible to generalize on observations made on only three species.

---

[1] F. J. O'Rourke, "The Rate of Progression in Ants," *Ent. Rec.*, 59, 2.

NEW SOUTH AFRICAN GENUS OF MURICIDÆ.

By J. R. le B. Tomlin.

(*Read 7th June, 1947.*)

There is a small group of South African marine shells which may conveniently be segregated and which I propose to call *Afritrophon.* They are small shells, with somewhat the appearance of an *Ocenebra*, canal very short, suture deep, whorls with one or more very strong spiral ribs, and generally the spaces between the ribs are crossed by small riblets so as to produce a latticed effect.

There is the usual drawback that so often meets one in describing South African shells, namely that hitherto no live specimen has been taken. It is a homogeneous little group and, I think, worth a separate name. The genotype is *Trophon kowieensis*, Sowerby, *Proc. Malac. Soc.*, iv, p. 213, pl. 22, f. 16, 1901, " The Kowie."

Thiele was inclined to think that they might be placed in *Trophonopsis*—a name founded by Bucquoy Dautzenberg and Dollfus for the *Murex muricatus* of Montagu.

The other species which I suggest placing in this genus are as follows :—

Trophon ? agulhasensis Thiele, Wiss. Ergebn. der Deutschen Tiefsee Expedition, vol. 17, p. 169, pl. 30 (18), f. 12, 1925. Agulhas Bank.

Trophon jucundus Thiele, as above, f. 13. Agulhas Bank.

Trophon ? insignis Sowerby, *Proc. Mal. Soc.*, iv, p. 2, pl. 1, f. 1, 1900. The Kowie.

Cominella acutispira Sowerby, *Proc. Malac. Soc.*, vol. xiv, p. 125, text-fig., 1921. Port Alfred.

There is also a young shell figured by Thiele, op. cit., p. 170, pl. 30 (18), f. 16, 1925, unnamed, from the Agulhas Bank.

The four supposed new species of *Trophon* figured by Turton on his plate 18, all from single specimens, look as fragmentary as many of the other " new species " described in *The Marine Shells of Port Alfred.*

Retinella nitidula (Drap.) monstr. sinistrorsum.—Sinistral specimens of *R. nitidula* are sufficiently uncommon to be placed on record. In April, 1947, I collected a sack full of flood rejectamenta from the bank of the River Tas at Smotton (or Smock Mill) Common, Saxlingham Thorpe, Norfolk East, with the primary purpose of searching for *Vertigo angustior* (Jeffreys). Altogether 48 species were found, but the real reward for many hours of careful sifting was not only several shells of *V. angustior* but a young sinistral *Retinella nitidula*. Incidentally, both here and at Flordon, further up the river, *Vertigo substriata* (Jeffreys) and *Cecilioides acicula* (Müller) were also present, neither of which has been authenticated for vice-county 27 in the Society's *Census*, though both species are recorded from Norfolk East by Mayfield (*Trans. Norf. and Norw. Nat. Soc.*, viii, 1909, pp. 797 and 798).

A. E. Ellis.

Dimensions of Anodonta minima Millet.—The largest British specimen of *Anodonta minima* of which I have been able to discover published measurements is one 88 mm. in length, 49 mm. in height, and 35 mm. in width, from the River Teme (*Proc. Malac. Soc.*, xvi, p. 165). Germain gives the maximum size of *A. elongata* (Holandre) (a synonym of *A. minima*) as 90 by 45 by 25 mm. The dimensions of two specimens collected in July, 1947, in the River Thames above Chertsey are 88 by 48 by 20·5 mm. and 90 by 50 by 25 mm.

A. E. Ellis.

LOFTUS ST. GEORGE BYNE (1872-1947).

By R. Winckworth.

Loftus St. George Byne was born at Teignmouth on 19th September, 1872, the son of a Bombay merchant, born in Exeter. He was educated at Bath College and at Owens College, Manchester; after taking the degrees B.Sc. and M.Sc. he became a lecturer in chemistry. He was an enthusiastic collector of shells and explored Teignmouth Bay thoroughly with a dredge, besides collecting in Cornwall and on other British shores. In 1914 he bought the Mason collection, one of the richest collections of British shells (see this *Journal*, **21**, 186), which eventually went to Liverpool Museums, where most of it was destroyed by enemy bombs in May, 1941. He also assembled by purchase and exchange good series of the cowries and cones of the world. Increasing blindness forced him to give up his collections, which he disposed of in 1924. In the same year he resigned from the Linnean Society of which he was elected a fellow in 1914. It was astonishing at this time to see him handle shells and recognize species by touch. All the later part of his life was spent at Exmouth, where at one time he shared a house with his brother, Colonel Byne, who died two months before him. He died on 17th June, 1947, in a nursing home at Exmouth, and to the end visitors found him contented and happy and anxious for a talk on shells. His published work includes some papers on the corrosion of shells in cabinets, which he traced to butyric and acetic acids: more recent work quoted in this *Journal*, **20**, 99, has proved that in oak cabinets the incrustation is calcium acetate. He was a member of the Conchological Society from 1888 to 1908.

Published Papers by L. St. G. Byne.

1890 *Adeorbis subcarinatus* at Teignmouth. *J. Conch.* **6**, 164.
1893 A contribution towards a list of the marine Mollusca of Teignmouth. *J. Conch.*, **7**, 175–188.
1896 The marine Mollusca of Teignmouth Bay. Additions. *J. Conch.*, **8**, 162–7.
1899 The corrosion of shells in cabinets. *J. Conch.*, **9**, 172–8, 253–4.
1900 On the forms of *Lacuna puteolus*. *J. Conch.*, **9**, 341–2.
1901 (with A. Leicester). The marine Mollusca and Brachiopoda of the Isle of Man. *J. Conch.*, **10**, 75–85.
1902 Note on a colour variety of *Cypræa argus*. *J. Conch.*, **10**, 193.
1904 The type of *Cypræa caput-anguis*. *J. Conch.*, **11**, 57.
1906 The prevention of corrosion in shells. *J. Conch.*, **11**, 360–1.
1907 The prevention of corrosion. *J. Conch.*, **12**, 32.
1914 On *Testacella maugei* in Cornwall. *Proc. Malac. Soc.*, **11**, 3.
1914 The limpets of the Cornish coast. *J.R. Inst. Cornwall*, **19**, 357–9.
1915 On *Testacella maugei* in Cornwall. *J.R. Inst. Cornwall*, **20**, 93–4.
1916 On monstrosities in Cypræa. *Nautilus*, **30**, 34–9.

MOLLUSCS IN THERMAL POOLS AT MATLOCK BATH.

By T. Warwick.

(Read before the Society 22nd November, 1947.)

At Matlock Bath, water at a temperature of 19° C. issues from a crevice in the limestone, and after running through a series of artificial pools, discharges into the River Derwent. This water, in October, 1943 (when the present observations were made) had 95–100 parts per million of Calcium and 29–31 parts per million of magnesium.

No complete list of the species present was made, but the following were noticed: *Lymnæa peregra* (Müller), *Bithynia tentaculata* (L), *Hydrobia jenkinsi* Smith, and *Theodoxus fluviatilis* (L). Of these snails, *H. jenkinsi* was easily the commonest, being found in all the pools except the tiny one into which the water flows immediately after its emergence. Both smooth and keeled varieties of this snail were found; the shells were free of the black incrustation so often found. However, some shells showed a calcareous deposition—not surprising when one considers the "petrifying" qualities of the water, saturated as it is with unstable mineral bicarbonates. The lowest pool in the series is also easily the largest. It is near the Pavilion Pump Room, and its temperature was 15° C. with an air temperature of 10° C. *H. jenkinsi* is found in several of the local millponds and reservoirs, and *T. fluviatilis* is present in the River Derwent.

The special interest of these habitats would appear to lie not only in the unusual fact that the waters are thermal, but in the probability that their composition is likely to remain very constant for long periods of time. Some molluscs, notably *L. peregra*, seem liable to changes of shell shape which undergo a periodic variation dependant probably in part upon external factors (Dean). In these ponds it may be found that variations in the composition of the water could be neglected. Temperature variations, especially in the smaller pools near the source of the water, might also be less than in many loci. Consequently the effect of other factors, such as variations in micro- and macro-flora could be more clearly gauged.

I am indebted to my friend, R. Maxwell Savage, Esq., for the estimations of calcium and magnesium.

Reference.

Dean, J. D., Periodic Variations in *Limnæa pereger* (Müller), *Journ. Conch.*, xiii, p. 48.

PHYSA ACUTA DRAPARNAUD WITHOUT SHELL.

By Stanislaw Feliksiak.

Among *Physa acuta* (Drap.) creeping on the wall of an aquarium one individual differed considerably from the others in its peculiar appearance (Fig. 1). It was evident that its entire visceral sac was naked, the edge of the mantle was strained like an umbrella with strongly protruding digitated shoots. It crept very slowly and only owing to movements of the cilia which covered the foot. During one hour it covered scarcely 4 cm. The empty shell with 4·5 whorls lay at the bottom; the dimensions were: the shell 7·6 by 4·25 mm., the aperture 4·25 by 2·5 mm. The walls of the shell were completely clean inside.

Next day the snail crept—its foot clinging to the superficial surface pellicle of water—about 15 cm. from the place observed previously. Of its visceral sac remained only a transparent film. The dorsal part of the mantle was dark, forming a typical pattern (Fig. 2). The fore edge of the mantle rose obliquely over its head.

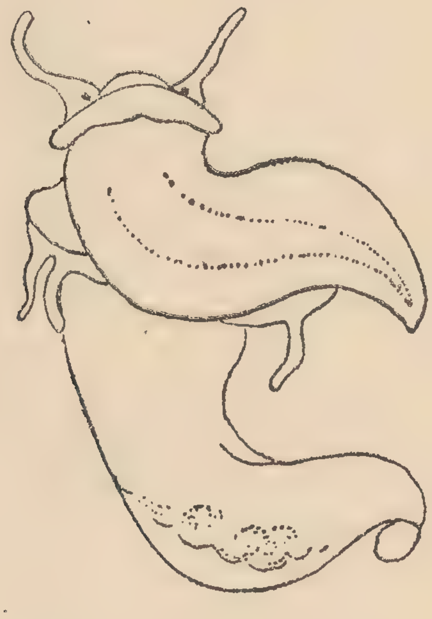

Fig. 1. × 5.

After four days of observations the snail died. It lay at the bottom of the equarium and its visceral sac was almost completely dissolved.

In this case the reasons are unknown why the columellar muscle came off from the lower edge of the columella. It is possible that a long stay in water during the winter months, when the temperature of water varied from 10° C. down to 1° C., contributed to that.

In order to ascertain how long *Physa acuta* (Drap.) can live without the shell, one individual from the same population, kept in similar conditions, was submitted to a gradual removal of the upper, older whorls without, however, damaging its visceral sac. From the five whorls of the shell (length 9·75 mm.) only three (length 9 mm.) were left for one month and a half, the upper whorl was, moreover, empty and open during the whole time. The visceral sac filled only the two last whorls.

After the removal of the next whorl only two of them remained for one month (length 8·5 mm.). The removal of the second whorl, leaving only the last youngest one (length 8 mm.), caused the death of the snail.

In the case of an individual of *Radix auricularia* (L.) a similar experiment made with the shell, leaving only the last whorl caused the decomposition of the visceral sac beginning from its top. That individual, however, lived 13 days.

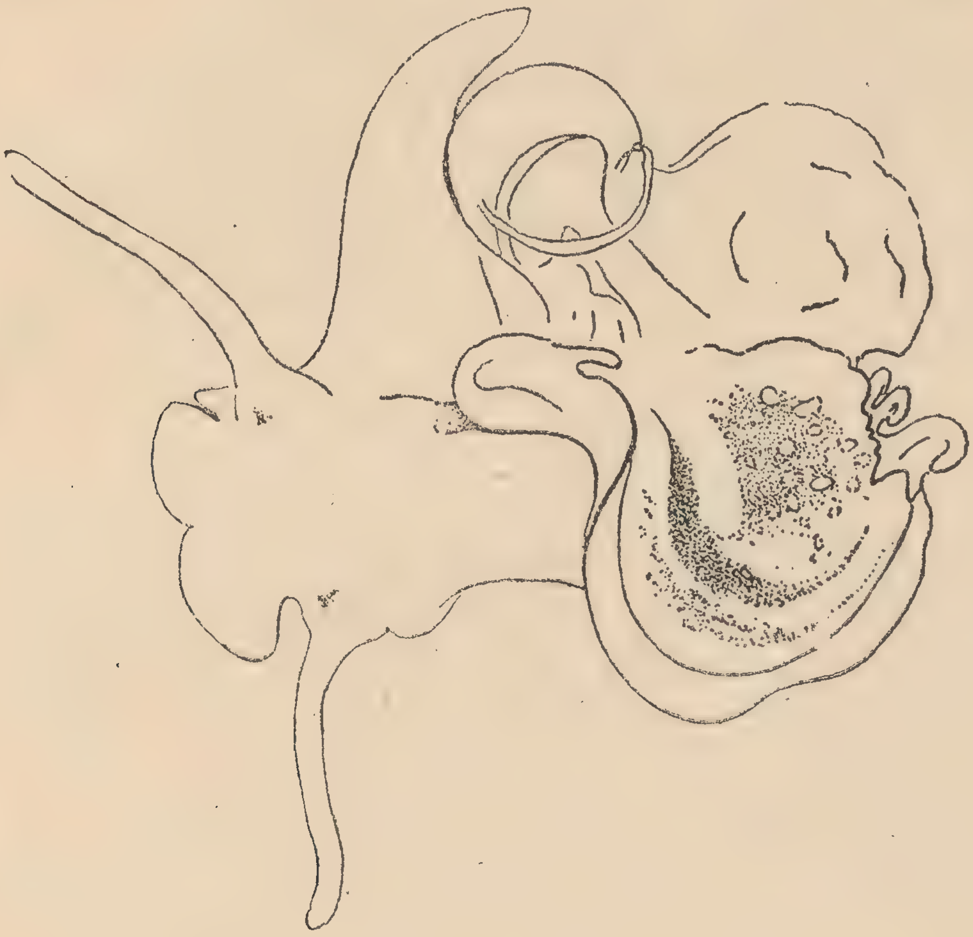

FIG. 2. × 8.

Every removal of the shell causes in the end the death of the snails. For the shell is indispensable for keeping the proper tension of the tissue of the visceral sac and to give support to the muscular system connected with the columellar muscle.

ZOOTECUS INSULARIS EHRENBERG

By Lieut.-Col. A. J. Peile

The fullest account of this species available to me at present is in *Fauna of British India*, Mollusca, ii, 1914, pp. 366–9. It is evident that this snail is tolerant of many varying climatic conditions.

The type locality is Camerun Island in the Red Sea, where (speaking from memory) it was found " under the tree near the well ". I collected two specimens at Aden in 1888 under stunted bushes at the shore (southern) end of Gold Mohur Valley in company with the much larger *Euryptyxis labiosa* (Müller). These two species are also associated on Dumsuk Island, Farsan group in the Red Sea, collected by W. A. Macfadyen. At Aden rain occurs at very rare intervals, but there may be considerable moisture in the air from the sea, especially during the south-west monsoon.

My next collection was at Rawal Pindi in the Panjab, where shells were found in drifted material in the nearby river beds during the dry season. I could not trace the source of supply of the shells. Rain occurs during the monsoon period and short storms occur in the winter. Generally speaking the ground temperature varies between extremes of dry heat and cold according to the season.

My only other experience was in Bombay, where I found the *Zootecus* on level uncultivated ground between Marine Lines and Back Bay at the southern end of the Island. The heavy rainfall here is confined to the south-west monsoon, that is to about four months from June to September. I have received specimens of typical form and also of the vars. *pullus* (Gray) and *chion* Pfr. from many of the localities quoted in *Fauna of British India*, notably from Karachi where, my correspondent stated, the shells were extremely abundant on the land round the town. Those collected here were all dead ; many contained young shells.

I have no information about local conditions at the other Indian stations, but it would seem probable that they must be very varied both as regards rainfall and temperature.

In pursuing investigations the occurrence of *contiguus* Reeve at Abd ul Kuri and *diaphanus* in the far removed Cape Verde Islands should not be overlooked. On the whole it may be supposed that the genus *Zootecus* has become adapted to many conditions of life and that the presence of fossil shells in a deposit would not be conclusive evidence as to climatic conditions in the past.

THE ECOLOGY OF *LIMAPONTIA CAPITATA* (MÜLLER).

By N. F. McMillan.

(*Read before the Society 22nd November, 1947.*)

Limapontia capitata (Müller) is unusual among opisthobranchiate mollusks in its habitat. It occurs in rock-pools near the top of the intertidal zone as well as in salt-marsh pools, and it was thought that regular observations in a selected locality might yield results of interest, as little appears to be known of the bionomics of the species.

The field work was carried out at Greenisland, Co. Antrim, during 1935–1936–1937, with additional observations at Hilbre, Cheshire, in 1940–1941.

Previous Work.

Limapontia capitata was first described as a British species by G. Johnston (*sub L. nigra*) in 1836. In 1848, J. Alder and A. Hancock gave a good account of the seasonal occurrence of the animal in Northumberland, and also in Cornwall (*fide* Cocks); they also described the spawn and veligers. H. A. Meyer and K. Möbius (1865) figured spawn and adult mollusks, and gave details of habitat, date of spawning, etc., in Kiel Bay. P. Pelseneer (1893) published figures of the nervous system genitalia, etc., and in 1938 K. Vestergaard and G. Thorson figured spawn and veligers. The structure of the gut has been investigated by V. Fretter (1940).

Concerning the habitat G. C. Robson (1920) gave some details as to salinity-range, associated fauna, etc., in an Essex locus; E. A. T. Nicol (1935, 1936) working in two Scottish localities, gave fuller figures for salinity, alkali reserve, oxygen-tension, etc., of some salt-marsh pools and brackish lochs in which *L. capitata* occurred. D. K. Kevan (1934, 1939) in his account of the allied *L. depressa* A. & H. included data on *L. capitata* and J. G. Jeffreys (1865), quoting Lindström, gave a list of the mollusca living with *L. capitata* in the Baltic.

Life History.

In the spring and summer of 1937, *L. capitata* was successfully reared to the free-swimming veliger stage, and in 1940 the work was repeated, and two post-larval stages also obtained.

The yellowish sausage-shaped spawn-masses are well figured by Vestergaard and Thorson (1938) who say that the spawn occurs attached to various algæ, and *Zostera*, but at Greenisland spawn was only once found, despite careful and repeated searches in the pools frequented by the adult animals.

The date of spawning seems to vary widely; the following dates have been collected from the literature: March (Kiel; Meyer & Möbius, 1865); June (Co. Dublin; Colgan, 1914); June, August (Jutland; Vestergaard & Thorson, 1938); July (Falmouth; Alder & Hancock, 1848). The Greenisland spawn was obtained on 9th May, 1936. Colgan (1914) has noted that one pairing is sufficient to fertilize several lots of spawn.

In captivity my *Limapontia* spawned freely, and daily observations were made on isolated spawn-masses. The newly laid yellowish ova always showed a light patch at one end of the ovum. Development then proceeded as follows: segmentation (repeated); invagination; gastrulation began, and the embryo assumed a kidney-shape; the shell-gland appeared as a cap of large cells on the posterior end of the veliger. At this stage what appeared to be the blastopore was still open. Next cilia appeared, and the veligers began to show traces of pigment, and also to assume the characteristic three-lobed shape, when the black pigment at the mouth-opening and excretory organ is conspicuous. The larvæ hatched as shelled veligers and retained the shell for some time, swimming vigorously by means of the velar lobes. The row of large cells at the edge of the velar lobes is a useful characteristic for identification, according to Vestergaard & Thorson (1938).

Below are set out the developmental stages of four lots of spawn from Greenisland *L. capitata*. Lots I and A in ordinary sea-water, Lot II in Schreiber's Culture-Solution, and Lot B in Baker's Culture-Solution for part of the time.

	Period of Observations (all in 1937).			
	Lot I.	*Lot A.*	*Lot B.*	*Lot II.*
Stage of development.	*14th April–3rd May.*	*2nd March–5th April.*	*2nd March–4th April.*	*18th April–5th May.*
Segmentation . . .	5th day	Jelly round ova much swollen. 4th March.	Put into Culture-Solution 13th day.	2nd day
Invagination . . .	—	—	—	3rd day
Veligers revolving .	7th day	13th day	13th day	6th day
Pigmentation begun	9th day	18th day	17th day	8th day
Three-lobed shape assumed . .	9th day	13th day	—	14th day
Increased in size and revolved vigorously until . . .	21st day	23rd day (at least) [1]	—	17th day
Veliger freed . .	—	—	34th day	—

The one veliger which hatched out unfortunately died soon afterwards, and did not metamorphose.

In June, 1940, the observations were repeated, using animals from Hilbre, off the mouth of the River Dee, Cheshire. This is on the fringe of a heavily-polluted area (the River Mersey). The following results were obtained:

Stage of development.	*Spawn deposited 12th June, 1940.*
Repeated segmentation and invagination, 4 of the embryos have developed cilia and are moving very slowly	24 hours later (13th June, 1940).
Veligers ciliated and revolving fairly rapidly .	24 hours later (14th June, 1940).
Veligers assumed obscurely-3-lobed shape. Cilia longer and veligers larger	24 hours later (15th June, 1940).
Beginning of pigmentation	24 hours later (16th June, 1940).

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[1] Owing to my absence no observations were made 26th March–3rd April. Lots I, II, and A were all found to be dead the day after the last observation given above.

In a dish containing several lots of spawn (oldest deposited 11th June, 1940), free-swimming veligers were fairly frequent on 28th, 29th, and 30th June.

From the above results (excluding the material kept in culture-solutions, as development is probably not normal in such conditions), it will be seen how directly the rate of development appears to be controlled by the temperature. The Hilbre material was under observation during very hot weather, whereas the two Greenisland lots (I and A) developed in cool spring weather, in a cold, dark room. Vestergaard and Thorson (1938) found that with a water-temperature of 15–17° C. development from spawn-mass to freeing of the veligers occupied 7–8 days. Under poor aquarium conditions the same process took from 7–13 days. Alder and Hancock (1848) state that they obtained free-swimming veligers on the 20th June from spawn deposited 3rd–4th of the same month.

On 8th June, 1940, ten examples of adult *L. capitata* were collected from a " green " pool on Hilbre, and kept in a small aquarium. The last spawn-mass was deposited on 22nd June, and free-swimming veligers were abundant on 30th June. Two later stages were obtained, the younger was a minute slug-shaped transparent animal, with the visceral mass still forming a round hump separate from the foot. No eyes were observed, and the animal progressed rapidly, half-swimming, half-crawling. Two examples of this stage were found, on 28th June and 1st July, so that they must have been at least 6 and 9 days old respectively. In a later stage the visceral hump had gone, the animal only crawled, and eyes were present. Save in size and its being transparent it did not differ in appearance from a normal adult *L. capitata*. This stage was observed on 29th June, when it must have been at least 7 days old. Of course, all these post-larval stages may be much older, for the first spawn was noted on 11th June; the ages suggested are the minima.

Although the actual metamorphosis was not seen, yet the Hilbre specimens attained the crawling stage very quickly. The adult specimens were collected on 8th June, and from spawn deposited in captivity (first spawn deposited 11th June) the later crawling stage was obtained on 28th June, showing that the whole cycle took place in a maximum of 17 days.

The problem of what becomes of the young mollusks after they metamorphose has hitherto remained unsolved, but it now seems probable that they live on the alga *Bryopsis plumosa*, near low-water mark, or in shallow water, for the summer at least. Garstang (1890, p. 422) states that " early in August a number of specimens were found creeping upon *Bryopsis plumosa* at low water " at Plymouth, and Beaumont (*in* Browne *et alia*, 1900, p. 759) records it dredged in 0–3 fm. at Valentia, Co. Kerry. On 7th June, 1941, a very small specimen (under 1 mm. long) was taken on *Bryopsis plumosa* in a very muddy pool at L.W.O.S.T., Hilbre. This example ate *Cladophora* sp. in captivity, but would not touch it until all the *Bryopsis* was consumed. From 23rd June it was fed on *Cladophora rupestris* (*Bryopsis* not being readily obtainable) and grew rapidly; on 31st August, it measured almost 5 mm. long when extended. At this time it seemed to have attained its full size, for although it remained apparently healthy and fed well until 11th March, 1942, yet it did not increase in size any more. Its death in March, 1942, was due to an accident.

Another specimen, from Greenisland, collected on 10th April, 1936, lived in captivity until 18th December, 1936, when it was accidentally killed. But the record for longevity is surely held by an adult specimen which was taken at Hilbre on 19th May, 1940, and lived in captivity until 12th July, 1941. There was no obvious cause for its death. It spawned in 1940, but not in 1941, and was therefore presumably about two years old when it died, possibly of old age.

FOOD.

The food-plant of *Limapontia capitata* appears to be always some species of *Cladophora* or—much less commonly—of *Chætomorpha*, and Fretter (1940) has shown that the alimentary canal of the mollusk exhibits specialization for manipulating their filamentous algal food. At Greenisland, the favourite alga is a bright pale-green *Cladophora* (identified as *C. utriculosa* Kütz by Dr. Helen Blackler), although *C. rupestris* and *C. arcta* were eaten as well. Captive *Limapontia*, over a period of fifteen months, when offered a choice of algæ, always ate *C. utriculosa* first. They also ate *C. rupestris*, *C. arcta*, *Chætomorpha ærea*, but refused *Enteromorpha* sp., *Ulva Lactuca*, and *Polysiphonia fastigiata*. Hilbre examples preferred *Cladophora flexuosa* and always ate it first, but they also ate *C. rupestris*, and *Chætomorpha litorea*, refusing *Polysiphonia urceolata*.

The association with *Cladophora* spp. seems to hold good over most of the mollusks' Britannic range, though the alga-species varies. Thus at Falmouth, Cocks (*in* Alder and Hancock, 1848) found *L. capitata* common on *C. glaucescens* but rare on *C. albida*. Colgan (1914) found it almost exclusively upon *C. rupestris* in Co. Dublin; but on *C. sericea* at Clare Island, Co. Mayo (Colgan, 1911). I have found the animal associated with *C. albida* at Bloodybridge, nr. Newcastle, Co. Down, with *C. refracta* at Torr Bay, Co. Antrim (Fisher, 1937), and on *Chætomorpha linum* at Hilbre. In addition specimens were once taken on *Percursaria percursa* in salt-marsh pools at Ballycarry, Larne Lough, Co. Antrim (Fisher, 1937), but this seems to be a very unusual occurrence.

Vaucheria littorea appears to be the food-plant at Aberlady (Nicol, 1935).

HABITAT.

On a rocky shore the characteristic habitat of *L. capitata* is stagnant high-level pools, containing a flora composed almost entirely of green algæ (spp. of *Enteromorpha*, *Chætomorpha*, and *Cladophora*); such pools are submerged for approximately 25 per cent of the time. Seven pools at Greenisland, in all of which *Limapontia* occurred yearly, were chosen for observation. They varied slightly in tidal-level, fauna, and flora, and observations were made regularly during the period Easter, 1935, to Easter, 1937, on the following points: (1) presence or absence of *Limapontia*, (2) condition of algal vegetation, (3) water-temperature (one pool only), and (4) general notes on the fauna and flora.

The island from which Greenisland takes its name is an island only at high water, and has many pools of varying sizes on its slopes. It is an isolated boss of basalt rising out of Triassic marls. In April, 1935,[1] every pool was searched, and it was found that *Limapontia capitata* only occurred in pools in which *Cladophora* spp. was present. Pools containing only *Enteromorpha* spp. contained no *Limapontia*. The seven pools specially investigated were each submerged for from 3–3½ hours, one for 4 hours.

The fauna and flora of pools at such a high shore-level is not rich and the alga-flora is more or less confined to species of *Cladophora*, *Chætomorpha*, and *Enteromorpha* ; other species are represented very sparingly. The following species were noted in the pools :—

Enteromorpha intestinalis Link. Common.
E. compressa Grev. One pool, October, 1935.
Ulva Lactuca L. var. *latissima*. Occasional plants.
Chætomorpha ærea Kütz. Frequent, summer.
C. tortuosa Kütz. One pool, October, 1935.
C. melagonium Kütz. One pool only, not common.
Cladophora rupestris Kütz. Common.
C. arcta Kütz. Common.
C. utriculosa Kütz. In every pool in which *Limapontia* occurred.
Sphacelaria sp. Very young plants, one pool.
Fucus spiralis L. Young plants, one pool.
Porphyra umbilicalis Kütz. One pool only.
Chondrus crispus Stackh. Sparingly.
Nitophyllum ramosum Batt. Very young plants, one pool.
Ceramium rubrum Ag. One pool.
Dumontia filiformis Grev. One pool.

The last seven spp. were all rare.

The fauna of the pools included, besides the seasonal *Limapontia*, the following :—

Mollusca : *Lepidochitona cinereus* (L.). Rare, single specimens in two pools.
Patella vulgata L. Several in one pool and a few in another.
Littorina saxatilis (Olivi). Fairly frequent in all the pools.
L. littorea (L.). Absent from one pool, plentiful in the others.
Rissoa parva (da C.). Several, in *Cladophora arcta*, one pool.
Mytilis edulis L. Very young examples in one pool, and occasional specimens in another.
Crustacea : *Balanus balanoides* (L.). Abundant in one pool.
Idotea viridis (Slabber).
Jæra marina (Fab.).
Gammarus marinus Leach.
Hyale nilssoni (Rathke).

Also the Polychæte *Spirorbis borealis* Daudin in one pool.

The water-temperature of one pool was taken regularly, but as conditions in such small bodies of water fluctuate so rapidly no useful purpose would be served by setting out the data obtained. It is of interest to note that the highest figure was 71° F. on 6th August, 1935, and the lowest 39° F. on 28th January, 1936 ; the lowest temperature recorded when *Limapontia* was present was 48° F. on 14th April, 1936. Nicol (1936) recorded *L. capitata* as " normally active in a water-temperature of 32·5° C. on 17th September, 1933 ".

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[1] At this time *Chætomorpha* spp. had not appeared in the pools.

PERIODICITY.

L. capitata appears in these Greenisland pools in early spring and is abundant until about July, after which it disappears. In 1935, it was first seen on 31st March, and had gone by 13th June. Next year it was first observed on 10th April, and had gone by 7th July, and in 1937 it was seen for the first time—a few only—on 15th February. The most careful searches have so far failed to produce any specimens, either adults or young, during the months between July and February. The close correlation between the growth of *Cladophora utriculosa* and the appearance of the mollusks in the pools may be merely coincidence, but it is very striking. When the alga begins to grow (usually in March) then the *Limapontia* arrives, and about July when the alga has nearly all gone they disappear. The animals are only occasionally found on *Cladophora arcta* or *C. rupestris*, and do not appear to migrate on to these algæ when *C. utriculosa* is exhausted. Particular attention was paid to this point during the three years during which the Greenisland pools were under observation, and the apparent dependence of the mollusks upon *C. utriculosa* was very noticeable. Elsewhere, this close relation between animal and plant does not seem to have been noted, possibly because both Kevan (1934, 1939) and Nicol (1935, 1936) worked on salt-marshes and brackish lochs, where the behaviour of the mollusk would not necessarily be the same as in rock-pools, and Colgan (1914) found it almost exclusively on the perennial *Cladophora rupestris*.

ENEMIES.

No animal has been observed actually feeding on *L. capitata*, but a very small *Carcinus mænas* and a *Gammarus* sp. were accidentally introduced into a small vessel containing seven adult *L. capitata* and six days later all the mollusks had disappeared.

On one occasion a specimen of *L. capitata* was dropped on to the disk of a small *Actinia equina*. The sea-anemone at once closed some of its tentacles over the mollusk, but after about two minutes relaxed its hold, and after about five minutes altogether the *Limapontia* was released and floated off apparently unhurt (McMillan, 1942). It is not obvious in what way the mollusk was unpalatable, as *Limapontia* does not throw off thick slime as some opisthobranchs do, nor is it known to possess stinging-cells of any kind.

Colgan (1914) mentions that some of his Co. Dublin specimens of *L. capitata* were infested with parasites, apparently copepod crustaceans, but no such parasites were seen in any of my specimens.

GEOGRAPHICAL DISTRIBUTION.

Limapontia capitata is widely distributed throughout the British Isles, from the Shetlands to Cornwall, as well as the Isle of Man and all round Ireland. Its European range may be summarized as follows : Iceland ; the Murman coast ; Norway, from East Finmark to the extreme south ; Denmark ; Heligoland ; Holland and Belgium ; France ; Portugal. In the Mediterranean it occurs on the French coast. In the Baltic it occurs throughout, in the Gulf of Bothnia associated with fresh-water mollusks (Jeffreys, 1865).

RESISTANCE TO LOW SALINITIES.

L. capitata has long been known to live in the Baltic in waters of low salinity, down to about 4 promille in the Gulf of Bothnia. Jeffreys (1865) (quoting from Lindström) states that the following mollusca live together in the Baltic; *Mya arenaria*, *Neritina fluviatilis*, *Bythinia tentaculata*, *Physa fontinalis*, *Limnaea stagnalis*, *L. auricularia*, *L. peregra*, *Tergipes lacinulatus*, *Limapontia nigra* (= *L. capitata*), *Mytilus edulis*, *Cardium edule*, and *Tellina balthica*. In the spring of 1937 experiments were made to test the salinity-range of *L. capitata* in captivity, with interesting results. The animals were kept in small glass dishes, holding about 300 cc. each, in a cool, dark room. Starting with sea-water, at intervals of three days the proportion of fresh (tap) water diluting the salt-water was increased by 5 per cent, a fresh mixture being made up every time to avoid the risk of possible salt-concentration due to evaporation. The sea-water used was that obtained off the Bar, off the mouth of the Mersey, and the salinity was rather below that of "normal" sea-water. Herdman and Dawson (1902) give the salinity of a station a mile north of the Bar Lightship as 32·61 promille, and accordingly 32·6 has been taken as the salinity of the sea-water used in the experiments. The mollusks were fed on *Cladophora* spp. throughout.

The results obtained may be set out thus [1] :—

Date.	*Salinity.*	*Notes.*	*Controls (in sea-water).*
15.2.37	Collected and placed in sea-water.	Lot B.	Lot A.
20.2.37	95% sea-water.	7 animals in each lot.	
22.2.37		3 spawn-masses.	7 spawn-masses.
24.2.37	90% ,,	3 more spawn.	3 more spawn.
27.3.37	85% ,,	2 more spawn.	
2.3.37	80% ,,	Few more spawn-masses.	Little more spawn.
4.3.37	75% ,,	One animal dead.	Spawn swollen.
9.3.37	70% ,,	Spawn swollen.	
12.3.37	65% ,,	Animals all well (4).	All well (6).
15.3.37	60% ,,		
18.3.37	55% ,,		
22.3.37	50% ,,		
25.3.37	45% ,,	One dead (3 left)	All well.
4.4.37	40% ,,	Another dead (2 left).	All well.
7.4.37	35% ,,		
10.3.37	30% ,,		
13.4.37	25% ,,		
16.4.37	20% ,,		
20.4.37	15% ,,		
23.4.37	10% ,,	Both active.	
27.4.37	5% ,,	Both active.	
30.4.37	2½% ,	Only one left. Died 3.5.1937.	

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[1] The *Limapontia* which died in 75 per cent salt water has been excluded as a freak. Three specimens (two of the test ones, and a control) died through crawling out and dying of desiccation.

From this it will be seen that the first *Limapontia* died when the sea-water percentage dropped to 45 per cent, the second in 40 per cent, while the third and fourth endured existence in only 5 per cent and 2½ per cent sea-water for some days each. Using Herdman and Dawson's salinity-figure, the four mollusks died at : (1) 14 promille ; (2) 13 promille ; (3) 1·6 promille, and (4) ·8 promille.

In view of the animal's Baltic habitats the above results are reasonable, although in the brackish lochs of North Uist (Nicol, 1936) the lowest salinity in which *L. capitata* occurred was 24 promille—a single specimen only.

Discussion.

Limapontia capitata is well fitted, by its tolerance of low salinities, for inter-tidal life, both in salt-marsh pools and the high-level pools it inhabits on rocky shores. In both habitats it has a "seasonal" rhythm, appearing inshore for about three months in spring and summer, and then disappearing, whether by migration or dying off after breeding is not known, although the latter seems the more probable (the captive specimens which lived through the winter were no doubt influenced by the abnormal conditions). The apparent absence of immature specimens and rarity of spawn at Greenisland suggests that such rock-pools, while suitable for adults, are not equally suitable for breeding purposes. Perhaps salt-marsh pools are the usual breeding-grounds. Yet the regular appearance of *Limapontia* in the Greenisland pools, year after year, is noteworthy, and the mollusks spawned freely in captivity. It seems just possible that two biological races exist within the species *Limapontia capitata*, one—the parent race—living and breeding in salt-marsh pools, and the other living for part of the year in inter-tidal rock-pools where its presence is dependent upon that of *Cladophora* spp., its food-plant. If this is so, then breeding in rock-pools might not be so successful as in the "normal" habitat of salt-marsh pools.

I am indebted to my friends Dr. Helen Blackler and Mr. R. MacDonald for the identification of the algæ and crustacea respectively.

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RARE SQUID AT THE CAPE

By K. H. Barnard.

(South African Museum.)

For purposes of record the occurrence of a third specimen of the Diamond Squid (*Thysanoteuthis rhombus* Troschel) at the Cape may be noted. This specimen is considerably larger than the two previously recorded specimens (*Journ. Conch.*, xx, p. 45, 1934). The mantle length is 760 mm. and the width across the fins 660 mm. It is thus about the same length as, but appreciably wider than the specimen mentioned by Jatta (*Fauna u. Flora Golf. Neapel.*, xxiii, p. 62, 1896), which was 740 by 560 mm.; but not quite so large as the male *nuchalis* Pfeffer, 1912 (800 by 720 mm.), which Naef (*F. u. Fl. Golf. Neapel*, xxxv, p. 463, 1923) regards as identical with *rhombus*. The present specimen, which is a female, came ashore, alive and in perfect condition, on Clifton beach on the west coast of the Cape Peninsula on 14th November, 1947. A cast has been made for exhibition.

Bedfordshire Mollusca. Future reports on this subject will be published in the *Journal* of the newly formed Bedfordshire Natural History and Field Club. Species which have been recently added to the county list are as follows :—

Viviparus viviparus (L.). A single dead shell found near Leighton Buzzard—an unsatisfactory record.

Carychium spp. Both *C. minimum* Müller and *C. tridentatum* (Risso) have been found in the county, the former at Ampthill Marsh.

Milax gracilis Leydig. In the north and south of the county.

Agriolimax lævis (Müller). Marshy ground in Great Hayes Wood.

Sphærium rivicola (Leach). River Ouse at Bedford.

For notes on these species see *Journ. Beds. Nat. Hist. Soc. and Field Club*, i, 16–23.

B. Verdcourt.

EDITORIAL NOTES.

At the end of the war Major G. I. Crawford the Assistant Keeper of Mollusca, resigned his post at the British Museum (Natural History), and his place has been filled by Dr. W. J. Rees from the Plymouth Biological Station.

Mr. J. C. Vickery, who has been for almost half a century in the Mollusca Department at the British Museum, retired at the beginning of June. I am able to print an admirable epitome of his career written by a colleague of his, Mr. E. Browning :—

There are few, even of those who feel that they have spent long years in the Museum, who can approach in length of service the term just about to be completed by Mr. J. C. Vickery, or who will have witnessed so many changes. On his retirement on the 2nd June, 1947, Vickery achieved—short of a few days—50 years of service with the Trustees. He was born on 2nd June, 1882, and he entered the Museum on 12th July, 1897. The extent, in number and magnitude, of changes during Vickery's period of service can only be sketchily indicated here, for he has served under six Directors, and has seen the installation of electric light and telephone and the introduction of typewriters. For the past 50 years his daily attendance in the Mollusca Section of the Department of Zoology has been devoted to the care of collections the steady growth of which rapidly outstrips the available accommodation, and to able assistance unostentatiously and willingly given to every conchologist who has ever worked in the Department, and duly acknowledged in not a few scientific papers.

During the illness of Mr. G. C. Robson, in 1933, and after his retirement, it fell to Vickery's lot to carry on the work of the Mollusca Section, which he continued up to the recent appointment of Dr. W. J. Rees, apart from a short interlude while Mr. G. I. Crawford was in charge of the collection.. In addition, the New Spirit Building stores of chemicals, glass, collectors' boxes, and requisites was his special responsibility and contributed something more to the trials of a busy man.

He saw service with the old 2nd South Middlesex Volunteers, transferring to the 10th Battalion Middlesex Regiment (Duke of Cambridge's Own) on the formation of Lord Haldane's new Territorial Army, retiring in 1913. Shortly after the outbreak of World War I he rejoined the Army and served—who shall say without distinction—in France and Belguim, where he was thrice wounded, the third time very severely at Cambrai, in August, 1918. This kept him in hospital seven months and he did not return to the Museum until March, 1919.

The Experimental Officer in the Museum to-day enjoys conditions of service far superior to those obtaining during the early days of Vickery's career, and not a little of the credit for these improvements in status and pay is due to the pioneer work of Mr. Vickery as Secretary of the Museum Attendants Association. This Association was the first organized attempt to secure betterment of service conditions, and the unstinted labours of Vickery and some of our colleagues since passed on are now coming to effective fruition.

We shall not readily forget his unobtrusive demeanour nor his imperturbable disposition, which hide, as we all well know, a warm—if not a boisterous—heart.

A correspondent writes : I was glad to see some account of G. C. Spence in the 9th number of this *Journal*. His friendly manner, quaint humour, and intelligent outlook made him always welcome on his occasional visits to London. To the list of his papers given on pages 206–7 should be added :—

Note on a " double-mouthed " *Holospira cockerelli* Dall. *Nautilus*, **41**, 94 (1928).
The epiphragm in *Streptaxis*. *Proc. Malac. Soc.*, **19**, 9 (1930).
Two new *Urocoptis* from Cuba. *Proc. Malac. Soc.*, **22**, 13 (1936).

Sphærium corneum has appeared in the settling tank of a bleach works at Bolton. The water in the tank was drawn from the River Croal, and the mollusk appeared in 1944 and rapidly became a pest as the animals got crushed in rollers and stained cloth in the final washings, involving extra bleachings and washings. Various poisons were tried, but were unsuccessful, and finally mechanical means of filtration were adopted to prevent the animals passing out with the water. Full account is by William S. Lacey, B.Sc., F.L.S., and is " Notes on the Orb Cockle *Sphærium corneum* L., and its Behaviour in Toxic Solutions," *North-Western Nat.*, xxi, 188–97, 1947.

The collection of shells made by the late Lt.-Col. Le Cronier Lancaster, of Lyme Regis, is going to the Liverpool Museum, which suffered so severely during the war. It is, however, satisfactory to learn that the Marrat types of *Oliva* and *Nassarius* are safe, as are the magnificent *Pleurotomaria* from the West Indies, presented by Deputy Surgeon-General S. Archer, a good deal of the Winckworth British Marine collection, the Lady Lyons collection, presented by Dr. Quick, and that of Thomas Edwards (received in 1943).

An up-to-date catalogue of the Marine Shells of Dorset, by E. R. Sykes, has recently appeared in the *Proceedings* of the Dorset Nat. Hist. and Archæological Society, vol. 67, pp. 127–42.

It is practically half a century since Mansell-Pleydell's *The Mollusca of Dorsetshire* was published, and Sykes' admirable list adds considerably to this book, both in species and in localities, as well as bringing the nomenclature up to present-day usage. The Dorset coast is rich in Mollusca and has attracted many conchologists: among these Sykes mentions the following well-known names—Forbes, Jeffreys, Maton, Rackett, Pulteney, Hanley, Damon, Rowe, Robert MacAndrew, Templer, William Thompson, and of course Mansell-Pleydell. Of some of these, interesting biographical notes are given. One wishes that more such notes were added by the compilers of local lists. It is astonishing to anyone who tries to put together such data how difficult it often is to obtain accurate details of dates and life history.

I hear that the Mollusca in the Senckenberg Museum at Frankfurt are practically intact. Clessin's and Geyer's collections in the Stuttgart Naturalien Cabinet are destroyed.

Inquiries have recently been made at Rostock as to the present condition of Link's collection and the possibility of identifying any type specimens described in his *Beschreibung der Naturalien-Sammlung der Universität zu Rostock.*

Professor P. Schulze, in whose charge this collection now is, replies as follows — " kann aber keine Stücke mit Sicherheit auf Link zurückgehen. Wohl aber enthalten manche Stücke Namenszettel, die sehr gut aus Link's Zeit stammen könnten."

Link's work is now extremely rare. A facsimile edition of the Mollusca portions was published by Stephen Austin and Sons in 1931.

The *Nautilus* for October, 1945, contains an interesting account of the discovery of a new and prolific colony of *Cepæa nemoralis* at Brighton, N.Y., with much information on its local ecology. As an instance of its abundance it is mentioned that nearly three hundred snails occurred on a space 30 by 20 feet.

In vol. 57, p. 6 of the above serial is a most interesting paper by R. W. D. Dexter of the " Local Movements of *Litt. littorea* and *Nucella lapillus*." It was found that the marked specimens of *L. littorea* moved a daily average minimum distance of 22·2 inches. Five days after marking four individuals were 38, 49, 114, and 142 inches from their original stations. The periwinkles did not follow any given direction or uniform rate of movement.

N. lapillus averaged 10·4 inches of total movement per day. In general it did not travel as extensively as *L. littorea* which feeds on algæ both microscopic and macroscopic. *N. lapillus* fed principally on *Mytilus edulis* and on *Balanus balanoides*, and tended to remain on barnacles in crevices and under algæ for long periods and to remain within a restricted locality.

Dr. H. A. Rehder has a very useful note on the *Museum Boltenianum* in the *Nautilus*, vol. 59, pp. 50–52. He shows that it was already in print by 15th January, 1799, at least five months before the appearance of Lamarck's *Prodrome:* also that it fulfils the principal conditions of publication in that it was offered for sale through the medium of a widely read journal—the *Intelligenzblatt der Allgemeinen Literatur-Zeitung*.

We regret to report the death of a former President of the Society, Major Matthew Connolly, on 27th February last. He was born on 13th February, 1872, in Bath, the only son of Vice-Admiral Connolly of Bath, and his wife Harriet, whose father, Rev. Charles Kemble, was rector of Bath and restorer of the Abbey.

Connolly was educated at Haileybury and Sandhurst, from which he passed out top of his batch and joined the King's Own Yorkshire Light Infantry. In 1913 an attack of rheumatic fever affected his heart and forced him to retire. During the first world war he worked at the Record Office. His interest in conchology developed while he was in charge of signalling operations in the South African War during long isolated spells on the veldt.

He was also an ardent collector of stamps and minerals, a student of the pedigrees of race-horses, and a lover of all the culinary arts.

Towards the end of his life he derived great pleasure from helping M. André Simon in his *Dictionary of Wine and Food.*

In 1900 he married Muriel Vernon, daughter of Colonel Edward Vernon, of Clontarf Castle, Dublin. He is survived by his wife who for reasons of health has been living in South Africa, and by one son, Cyril Connolly.

He had a remarkable memory, a passion for detail, and if he had not been born into a family with a long tradition of service in the Navy he would undoubtedly have adopted a scientific career from the first. His Army career took him to Ireland, Gibraltar, South Africa, Hong Kong, and elsewhere. Perhaps the happiest period of his life was spent at his Surrey house, arranging his collections. In this last war he was too old to do war-work. He narrowly escaped death from a flying bomb in June, 1945, when most of his hotel was demolished.

He was buried at Bath Abbey cemetery.

It does not seem to be as generally known as it should be that the Linnean Society of London has undertaken the production of a series which is called *Synopses of the British Fauna.*

The Synopses are arranged to contain groups of convenient size and are in each case the work of a recognized authority. So far two have been published dealing with Conchology, both written by A. E. Ellis, who, since the issue of his *British Snails* in 1926, has been generally recognized as our leading authority on the Non-marine Gastropods of the British Isles.

It has always been a subject of general regret that Ellis confined his work to the univalves and had not subsequently tackled the bivalves. It is now with the greatest satisfaction that we welcome Nos. 4 and 5 of these Synopses ; No. 4 deals with *Corbicula*, *Sphærium*, and *Dreissena*, No. 5 with the *Unionacea.*

It is nearly half a century since we had a general account of the freshwater bivalves which are now treated of in No. 4. The Pliocene and Pleistocene species have never previously been described and figured thus comprehensively.

To complete the monography we have Ellis' paper on *Pisidium* in the *Proceedings of the Malacological Society of London*, vol. xxiv, pp. 44–88, plates 3 to 6, and he has been fortunate in being able to invoke his father's admirable technique and skill for the illustrations of all that he has done.

Synopsis No. 4 contains :—

**Corbicula fluminalis* (Müller)
**Sphærium solidum* (Normand)
,, *rivicola* (Lamarck)
* ,, *radleyense* Kennard & Woodward
* ,, *bulleni* Kennard
,, *corneum* (L.)
* ,, *dickinii* Clessin
,, *pallidum* Gray
,, (*Musculium*) *lacustre* (Müller)
Dreissena polymorpha (Pallas)

The asterisk denotes that the species is now extinct in this country.

Synopsis No. 5 contains :—

**Margaritifera* (*Pseudunio*) *auricularia* (Spengler)
,, (*Margaritifera*) *margaritifera* (L.)
,, (,,) *durrovensis* Phillips
Unio pictorum (L.)
,, *tumidus* Philipsson
* ,, *prestwichi* Kennard & Woodward
* ,, *cantianus* Kennard & Woodward
**Potomida littoralis* (Cuvier)
Anodonta (*Anodonta*) *cygnea* (L.)
,, (,,) *anatina* (L.)
,, (*Pseudanodonta*) *minima* Millet

In addition to the plates of first-rate photos are many text-figures, over which also the author had the co-operation of his father, the Rev. R. A. Ellis.

It remains to add that these Synopses are to be bought at the Linnean Society's Rooms at Burlington House—No. 4 for 2*s*. 6*d*. and No. 5 for 5*s*.

In a recent number of the *Nautilus* H. B. Herrington discusses the two chief methods of determining species in the Pisidia. After several years of study and frequent examination of an immense amount of material he prefers to rely on hinge characters rather than on differences in the external appearance of the shell. Sterki held that hinge characters only reveal groups and he proceeded to divide the groups into species, basing his work on differences in the external appearance of the shell. Herrington's view is that use should be made of both hinge characters and of external appearance, but where the latter is extremely similar in two or more forms, " the hinge characters should be the last court of appeal."

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The following corrections should be made in the List of Members recently published on pages 291 to 294.

Delete

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ROBERTS, A. W. R., Applegarth, Grange-over-Sands, Lancs.
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Insert.

L BOSTOCK, Edwin D., Alicombe, 8 Pelham Gardens, Folkestone.

Alter L to H before Tomlin.

Add L before Fitzgerald.

TAXONOMY AND THE IDEA OF IMPORTANCE.

By A. Tindell Hopwood, D.Sc., V.-P.L.S., British Museum (Natural History).

(*Presidential Address delivered 21st February, 1948.*)

Taxonomy is the science of classification ; in the narrow sense in which we as naturalists understand it, it is the formal expression of the results of biological inquiry. Aristotle was the father of taxonomy in both the wider and the narrower senses, for he was the first consciously to classify his materials even as he assembled them. His invention of genus and species was a major advance in the progress of human thought, and our notions of biological genera and species are but special instances of his generalization. In Scholastic language we still proceed *per genus et differentiam* as Aristotle did two thousand four hundred years ago.

The general principle which underlies taxonomy is one of deduction dependent on two types of proposition ; the first is an induction, whereas the second, based on observation, is empirical and pre-logical. Deductions are based on a given set of premisses, and the consequences which flow from those premisses according to the laws of logic are capable of rigid proof. Inductions, on the other hand, are approximations to the truth, and are always liable to be upset. For example, an inductive proposition that all snails have shells would be proved false by the discovery of a species of snail which was without a shell.

Now all reasoning depends on certain unexpressed assumptions or presuppositions, but that we are capable of reasoning is not a presupposition: it is knowledge. The realization that there are limits within which we reason is a demonstration that our intellects are transcendent, and not merely immanent within us. We must approach the problem of taxonomic presuppositions from another angle.

Imagine for a moment that we are sorting a tray of mixed shells, some big and some little. The big ones are soon disposed of ; these are *aspersa*, those *nemoralis*, and these others *arbustorum*. But what about the little ones, all more or less horn-coloured, tightly twisted, and none a quarter of an inch long ? The first thing we do is to reach for a lens. Why ? Because these little beasts are too small for us to see the details with the naked eye. So we realize that size and details are important. Moreover, we base our classification on the relative importance of different details, rejecting the less important and relying on the more important ones, the diagnostic characters as we so grandly call them. At this point presuppositions begin to crowd upon us so thick and fast as to make it necessary to seize upon one for further consideration before we are overwhelmed. Let us, therefore, take the presupposition of importance and consider some of its implications.

The notion of importance itself rests upon presuppositions, the obvious one being that there is something which is important. In other words, importance implies existence,[1] and, for us at least, existence of material objects, of plain brute facts. On the other hand, our intellects take no account of facts unless those facts are important in our general experience, but they cannot be important unless they are of interest. This leads us to the position that importance and fact are as thesis and antithesis, mutually dependent. It leads us further in so far as it shows that importance rests upon interest as a necessary presupposition.

But importance varies as interest varies. If it were not so, if everything were at one dead level, there would be no interest, and therefore no importance, and if there were no importance there would be no Taxonomy. In this way importance and interest presuppose selection, or preference, or choice ; when we say that a detail is important we are preferring it above its fellows.

Selection itself assumes freedom of choice ; it is the beginning of assemblage and a presupposition of Taxonomy. Because we select our facts we ignore part of the whole, and our taxonomic truths are only a part of the whole truth. Hence, Taxonomy is abstract, just as Science itself is abstract. The reason therefor lies in the finitude of our minds, which, being finite, are incapable of comprehending the whole, but are forced by their very nature to content themselves with parts of the whole.

In this short address I have tried to show that sorting a tray of shells is not the simple operation that it seems to be, but that it rests upon all sorts of assumptions, and that those assumptions are so wide and general that they shade off into still other assumptions. This is well worth keeping in mind, if only for the reason that it indicates the vague and general nature of the foundations on which the much-vaunted precision of Science is built.

---

[1] Sir Arthur Eddington complained that he was unable to find a philosophical definition of " existence " ; as I understand it, existence is the act of being, and to say that a thing exists is another way of saying that any one thing, no matter what, is what it is.

SHELL COLLECTION OF THE LATE REVD. E. G. ALDERSON, WITH SPECIAL REFERENCE TO THE GENUS *PILA* RÖDING.

By Arthur Blok, O.B.E., B.Sc., and T. Pain.

Considerable doubt appears to have existed about the fate of this collection. There is no reference to it in Mr. Tomlin's *Notes* on collections or in C. Davies Sherborn's *Where is the —— Collection?*, and the present authors have been unable to trace any published information about its ultimate disposition. It has now been located, apparently substantially in its original form and fortunately in responsible hands. The history of the matter is as follows :—

Ellerton Garside Alderson, who graduated in theology at New College, Oxford, in 1899, held successive church appointments and ultimately became vicar of Hartford, Huntingdon, in the diocese of Ely, in 1914. He retired, in due course, to private life at Ferring, near Worthing, and died there on 11th November, 1933, at the age of 65 years.

He was both a general and a specialist collector of shells and, possessed of the requisite means, he did not stint in acquiring any specimen that he wanted or in the arrangement and housing of his collection—his main table cabinet of forty drawers in three tiers, back to back, is a fine example of Victorian mahogany work. Its display provisions and the printed labels show him to have been methodical and gifted with a good sense of museum display.

By his will, which is dated 25th July, 1933, he left his shells and his books relating to conchology to his sister, the late Lady Eveline Maude Robinson, and after her death her executors caused the collection and books to be advertised for sale, together with Alderson's collection of butterflies in a sixteen-drawer cabinet and his books on the Insecta. This advertisement appeared in the *Museums Journal* of October, 1945 (Vol. 45, No. 7), and in two of the weekly lay papers. The material was housed in a private room at the Welbeck Hotel, Milton Street, Nottingham, for viewing by appointment, and Mr. L. H. Newman, of Bexley, was the agent for the sale. The Liverpool Museum was approached on the subject but the end of the matter was that the shells and shell cabinets were purchased by their present possessor, Lady Iliffe, who now has them at Yattenden Court, near Newbury, Berks. It is through the courtesy of Lady Iliffe that the authors have been able to examine the collection and prepare a catalogue of the *Pila*.

The evidence points to the collection as it now exists being substantially as it was when Alderson died. It falls roughly into two parts, viz. (i) a general collection of land and marine univalves, and (ii) the collection of *Pila* to which Alderson devoted so much labour and study and on which he wrote his *Studies in Ampullaria*.[1] As to the first item, it is known that Alderson was greatly attracted by large and showy shells and that he was willing to pay generously for anything of this sort that attracted his fancy—Mr. Tomlin, who saw his collection in his home, confirms this. The outsize and showy material, however, is not very noticeable in the collection as it now stands and it seems that much of it may have gone elsewhere. But many choice species are represented in specimens of ordinary size, e.g. *Cypræa aurantia*, Mart., *Cypræa friendii*, Gray (as *Scotti*, Gask.), *Cypræa decipiens*, Smith, *Voluta magnifica*, Chem. (a very large specimen). *Pleurotomaria beyrichi*, Hilg., and a good example of *Metorthalicus labeo*, Brod., but there are no really outstanding rarities.

---

[1] W. Heffer and Sons, Cambridge, 1925, pp. xx and 102 with 19 plates drawn from nature by the author. 150 copies were printed, of which 15 were coloured and signed by the author.

The *Cephalopoda* are represented by some of the larger *Nautili* and two fine examples of *Argonauta argo*, Lin., but there are no *Scaphopoda* or *Polyplacophora*. Freshwater species, other than the *Pilidæ*, together with the *Pelecypoda*, other than some of the more showy smaller *Pectinidæ*, are not represented at all. Nevertheless, it is a good working collection from world-wide localities and composed of carefully selected specimens obviously purchased, for the greater part, from dealers of repute.

The shells are not in boxes and rest in open trays on the bottoms of the drawers with wooden fillets separating one species from another and bearing the printed labels. Here and there a few specimens are faded and a very few are beginning to show signs of decay. The *Pilidæ*, to which reference is made below in some detail, are fortunately in good condition and the misplacements between shells and labels which the authors found have been rectified in this section of the collection. In view of the successive handlings and removals which the collection must have undergone and the fact that all the specimens are unboxed, these discrepancies were remarkably few. With the collection are a few sheets of Alderson's original pencil drawings for the *Studies*, some bundles of the labels which he had printed in a form specially suited to his cabinets, and a very few of his notes. No catalogue of the collection was found and if he had one it has disappeared.

Coming now to the *Pilidæ*, the collection is a particularly representative one, covering all the principal areas in which these shells occur and arranged in the cabinets in a geographical order. The most interesting feature is undoubtedly found in the shells used by Alderson for the figures in his *Studies in Ampullaria*. Unfortunately, he left no marks on the shells or any indication to show which were the actual specimens used, but he was a very gifted artist and his drawings and colour work are so carefully done that it is possible to recognize without doubt the majority of the figured specimens. After a careful examination of the collection it appeared that at least 80 per cent of the figured specimens could be picked out without difficulty.

For some reason still unexplained the author of the *Studies* did not deal by any means with all the species represented in the collection, possibly because he did not consider his specimens sufficiently characteristic for figuring. All of those which he did use for his figures are in as nearly perfect a condition as one could expect to obtain in an *Ampullaria*. He refused specimens on loan, maintaining that in this difficult genus it was essential always to have his material to hand for reference and consideration. But a magnificent example of the much prized *Ampullaria papyracea*, Spix (hab. Brazil and Guiana) is not even referred to in the text. Two other rare South American species should be mentioned here, viz. *A. granulosa*, Sow., and *A. sinamarina*, Brug., both from British Guiana, particularly fine examples of which are figured in the *Studies*. There is a specimen of *A. granulosa*, Sow., with the periostracum beautifully preserved, an unusual feature among museum specimens of this rare shell. Other individual specimens worthy of special mention are the *A. urceus*, Müll., shown in plate 3, Fig. 1, viz. a peculiarly elongated shell, smooth and banded and considered by Alderson to be a hybrid between *A. urceus*, Müll., and *A. nobilis*, Rve. ; and the single specimen of *A. d'Orbignyana*, Phil., in the collection. This specimen, which is figured in plate 7, Fig. 4, is similar to Philippi's type but, as noted by Alderson, it differs by being almost destitute of banding. Among the many examples of *A. speciosa*, Phil., the specimen figured in plate 19, Fig. 5, is of interest in that it is abnormally elongated, an unusual feature in this species.

Alderson went to great lengths to obtain good series of the more common species which enabled him to elucidate the true positions of many forms which had long been in doubt. Thus, the collection contains a remarkable range of *A. virens*, Lam., and its varieties, *A. ampullacea*, Lam., *A. urceus*, Müll., *A. glauca*, Lin., and varieties, *A. globosa*, Swains., *A. conica*, Gray, *A. paludosa*, Say, *A. lineata*, Spix, and *A. insularum*, d'Orb.

In total, 102 species are represented in the collection, besides a number of doubtful forms and a small series of *Lanistes*. A catalogue of the *Ampullaria* has been compiled by the authors and the shells have been marked with numbers corresponding to the catalogue entries for identification. Specimens figured in the *Studies* have been given a special marking for facilitating reference. The catalogue now remains with the collection.

In this description of the collection the generic name *Ampullaria*, Lamarck (1799), has been used in preference to *Pila*, Röding (1798), since Alderson always referred to the genus by Lamarck's familiar name both in his book and on the labels attached to his specimens. He gives his reasons for this in the introduction to the *Studies*.

A brief note on Alderson's books and collection of butterflies should, perhaps, also be put on record. His zoological library, including his remaining stock of unsold copies of *Studies in Ampullaria*, was purchased by Messrs. Watkins and Doncaster, of London, and his butterflies were bought by Mr. Newman, of Bexley, who describes them for the purposes of this note as a small collection, but one containing some choice Ornithoptera, a few blue Morphos and Papilios, none rare, but all choice specimens in excellent condition. There was also a number of cartons of foreign insects which had been somewhat neglected, with the result that many were in poor condition. The whole collection of Insecta passed into the possession of a collector in London.

The authors wish to record their indebtedness to Mr. John Farr, of Worksop Manor, Notts, Mr. W. K. Ford, of the Liverpool Museums, Mr. L. H. Newman, and Mr. J. R. le B. Tomlin for information which has gone towards the writing of the present note and especially to Lady Iliffe for the facilities which she has kindly given them for an examination of the shell collection in great detail at Yattenden Court.

MOLLUSCA FROM SURFACE SOIL AT MARLOW.

By T. Warwick.

Bombs jettisoned during the war caused a large number of craters to be formed in a field on the north bank of the River Thames, about one mile south of Marlow and opposite Bisham Abbey.

Examination of the crater edges showed 6 in. to 9 in. of dark brown top soil with shells and frog bones underlaid with stiff clay. The top soil is recent alluvium and the clay is alluvial clay.

Mr. A. S. Kennard most kindly identified the following list of molluscs from a sample of the top soil :—

Carychium minimum Müll.	8	specimens.
Lymnæa truncatula (Müll.)	5	,,
Planorbis spirorbis (L.)	1	,,
Cochlicopa lubrica (Müll.)	12	,,
Vallonia pulchella (Müll.)	7	,,
v. excentrica Sterki	2	,,
Retinella radiatula (Alder)	3	,,
Arion sp.	31	,,
Limax ? marginatus (Müll.)	1	,,
Trochulus hispidus (L.)	27	,,
Succinea putris (L.)	22	,,
S. pfeifferi Rossmassler	1	,,
Pisidium nitidum Jenyns	1	valve.

This list is characteristic of a wet meadow which is sometimes flooded. The floods could bring in the *Succinea*, *Planorbis*, and *Pisidium*. It is not a river deposit ; when it was formed the river probably ran (as it does now) some little distance away. As for its age, all one can say is that it may be of any age in the Holocene.

PROLONGED DORMANCY OF *PLANORBIS CORNEUS* L. AND *LYMNÆA PEREGRA* MÜLLER.

By G. L. Wilkins.

The following account of extremely prolonged dormancy of *P. corneus* and *L. peregra* has been brought to my notice by Mrs. D. Cornes, of N. Finchley, and appears to be far in excess of any record I have been able to discover.

Mrs. Cornes kept a small aquarium, 18 in. by 8 in. by 9 in., in which she kept a few fish, red *Planorbis*, *Lymnæa peregra*, and a certain amount of weed. The tank was supplied with sand to a depth of about 2½ in., fine and coarse mixed. In October, 1940, her house was let to strangers and surplus furniture and breakables were stored in a room together with the aquarium, which was emptied out and put away just as it was. In May, 1944, Mrs. Cornes returned to her home, unpacked the furniture, and came upon the aquarium, which was completely dry and coated with thick dust. The sand and what remained of the weed were still in the tank. In order to clean the sand she filled it with tap water and left it. Two days after she found that five snails had appeared, two red *Planorbis* and three *Lymnæa*. No weed had yet been put in the tank. Within a further few days the *Planorbis* began to lay eggs on the glass. The eggs subsequently hatched, but by this time fish had been added and they naturally disappeared.

Mrs. Cornes assures me that there could have been no possibility of water or anything else being put in the tank from October, 1940, to May, 1944. The room was quite watertight and had not been entered since her departure, thus it would appear that these snails had survived a period of 3 years 7 months without water, a goodly period even allowing for the sand remaining damp for a considerabe time. These snails are still living, the shell of a *Planorbis* examined shows a distinct demarkation which may be taken to be the period of growth stoppage, and then starts off again at an irregular angle which brings the mouth at rather a higher position than is usual in *P. corneus*.

SUCCINEA ELEGANS ROSSM. IN HERTS.

By L. W. Stratton.

In August, 1946, I dredged from the River Stort at Twyford Mill, Bishop's Stortford, Herts, a dead shell of *Succinea* quite unlike any I had collected before. In appearance it corresponded exactly with Ellis' figures of *Succinea elegans* (*British Snails*, 1926). I was unable to find any live specimens like it, though I collected what I took to be *S. pfeifferi*, and I did no more in the matter.

This year, I began gathering together records of Hertfordshire Mollusca, in preparation for the production of a County List. The following records for *Succinea elegans* were found.

From *Transactions*, Herts Natural History Society.

1853. Hoddesdon. Forbes and Hanley.
1878. St. Albans. J. G. Jeffreys.
1884. Ware. J. G. Jeffreys.
1912. Waterend, Great Gaddesdon. C. Oldham.

From *Flora and Fauna of Haileybury*.

1888. St. Margarets. Podmore and Stubbs.

From *Natural History of the Hitchin Region*.

1934. Letchworth. Miss Cockerell.

From Professor A. E. Boycott's Notebooks.

1915. Ditch by River Ver, St. Albans.
1916. Verulamium: New Barnes Mill, St. Albans; River Lea at Wheathamstead.
1917. River Colne, Wall Hall, Aldenham.

In view of H. E. Quick's 1933 paper, and the 1934 decision of the Society to discard all previous records of *Succinea*, I put them all down as probably *pfeifferi*.

In an endeavour to obtain further records, possibly unpublished, I got in touch with A. S. Kennard, A. G. Stubbs, and A. Martin, the last a member of the Bishop's Stortford Natural History Society.

Kennard sent me the following records for *Succinea elegans* :—

Hoddesdon.	Pickering collection.
River Stort.	Dr. F. Connor, 29th May, 1890.
Broxbourne.	Collected by himself, June, 1914.

All these shells are in his collection, and he said he had also collected the snail from the River Lea (or Lee) at Roydon and Nazeing on the Essex side of the river. Stubbs wrote saying he had collected *S. elegans* at St. Margarets, Amwell, and Rye House, all on the Lea, and he sent me some shells from the latter locus. These were sufficiently like my Bishop's Stortford shell that I began to wonder if the snail might occur in Herts after all. I therefore wrote to Martin, asking if he could supply me with live *Succinea* from Twyford Mill. He sent me an adult and a number of juveniles, which I sent on to H. E. Quick. I had a card from him on 25th September confirming that the adult was *elegans*. I then sent him my Twyford Mill shell, Stubbs' shells, and some I collected early in September at Broxbourne, and he thinks they are probably *elegans*, too.

It seems likely, then, that *Succinea elegans* is distributed all along the Lea Valley, at least from Ware to Broxbourne, and along the Stort to where it joins the Lea, and that the old records are correct in so far as they were probably mixed takings of *elegans* and *pfeifferi*. It is probable, also, that it occurs in Essex, since the Stort and the Lea form the boundary between the two counties, and that Kennard's Roydon and Nazeing records are correct also. Boycott's records, I think, definitely refer to *Succinea pfeifferi* for the River Ver is a tributary of the Colne, and *pfeifferi* from the Colne, sent by Boycott, are recorded in Quick's paper. Oldham's record must be regarded as doubtful, and Miss Cockerell's as very doubtful.

It is not out of place here to add something about the other two species of *Succinea* found in Herts. There is a number of records for *Succinea putris* from 1853 onwards to 1934, from various parts of the county. These, of course, need confirmation. Miss Selby, recorded it in 1884 for the River Colne, Aldenham to Watford. Boycott failed to find it there, 1915–19, but it is now the commoner species in this area. Quick has confirmed the species this year. Podmore and Stubbs, 1888, recorded it for the Haileybury area, and this I have confirmed. I have also taken it at Bishop's Stortford. It is probably generally distributed.

For *Succinea pfeifferi* there is only one written record, the Boycott-Quick snails from Aldenham. This year, I found in flood rubbish of the Mimmshall Brook, South Mimms, a single shell which I believe to be this species. Quick dissected one of the Bishop's Stortford juveniles, of which he says, " It agrees with *pfeifferi*, and is that species unless young *elegans* does not show the typical characters of the fully grown examples." He also considers one of the Broxbourne shells to be *pfeifferi*. There is no reason why it should not occur in the Lea Valley, and it probably does.

I am indebted to Dr. Quick for his dissections, to A. Martin for supplying the live material, and to A. S. Kennard and A. G. Stubbs for their valuable help in supplying records.

THE *CONCHOLOGIA ICONICA* OF LOVELL REEVE.

By A. E. Salisbury.

(*Read 21st February, 1948.*)

It does not appear to be generally known that the two forms of issue of Reeve's *Conchologia Iconica* (published in " Volumes " and as separate " Monographs ") were slightly different in presentation of the title pages. As issued in " Volume " form (twenty volumes in all) these titles were simply $\frac{1}{8}$ in. to $\frac{5}{16}$ in. block capitals stating " *Monograph/of the/Genus/Conus* ", for instance, or whatever the genus dealt with might be, and having below in lower case type a poetic quotation which was considered as being apt. Title pages such as this occur in separate Monographs but these were issued in the parts pertaining to the complete work and which were bound up separately by purchasers and they should not be confused with the Monographs issued as such, originally and individually by the publishers. These separately issued and complete Monographs have a much more elaborate title page and cover which were identical except that the cover was of thick blue paper whilst the inner title was on white. These Titles consisted of the name of the work in large $\frac{5}{8}$ in. ornamental lettering—*Conchologia Iconica./Monograph/* (in $\frac{1}{2}$ in. open block type then *Of the Genus/Murex/by/*Lovell Reeve. Three of these last lines being in black block type, the name of the genus being in $\frac{1}{2}$ in. characters whilst the name of the author is in $\frac{1}{4}$ in. script.

I have an example of this separate " Monograph " form, being that of the genus *Pollicipes*—which, of course, we do not now include in the Mollusca although Reeve embodied it in his work. I have seen other Monographs with these title pages and recently one of *Harpa* in the library of Mr. Tomlin.

A further item not without interest is the fact that apart from the nine supplementary plates issued with the completed Monograph of *Conus* a supplementary plate was completed even to being coloured, which was cancelled, and some at least of the figures thereon incorporated in plate VII of the ultimate supplementary plates. This cancelled plate was numbered IV and its figures were numbered 287 to 294; when, however, this plate was cancelled a new plate IV was issued and the figures were numbered 237 and upwards, this unfortunate error necessitating the " Notice " after the last described species " No. 283 ".

I have a copy of this cancelled plate and another copy is in the possession of Dr. Hopwood; it would almost appear judging from the fact that they are so completely finished and coloured that this supplementary plate was actually issued and later cancelled when the mistake in numbering occurred.

Incidentally, the Monograph of *Conus* (the first of the Conchologia) was published from January, 1843, to February, 1844, but the supplementary plates did not appear until 1848, 1849.

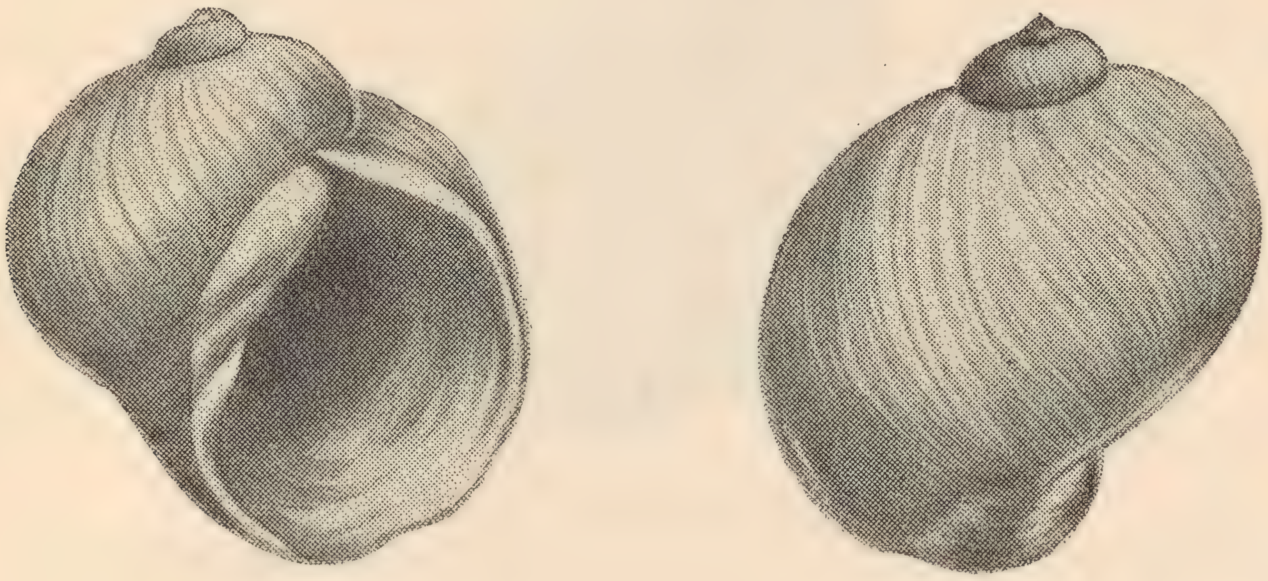
JANTHINA PALLIDA THOMPSON

By W. Fowler.

This uncommon species was described by William Thompson from a MS. name of Harvey's in the *Annals of Natural History*, vol. 5, p. 96, April, 1840.

Thompson says: "This *Ianthina*, of which a number of specimens were found some years ago by my friend W. H. Harvey at Miltown Malbay on the coast of Clare, is very distinct from the two British species, *I. fragilis* and *I. exigua*, and was named *I. pallida* by Mr. Harvey."

Whether it be really a nondescript species is difficult to be determined. The nearest approach I find to it is the *I. nitens*, Menke, as described and figured by Philippi in his excellent "Enumeratio Molluscorum Siciliae", but from this it differs in the columella being curved so as to present a somewhat rounded appearance, instead of being straight; the *Ianthinæ*, however, are subject to considerable variety. With the exception of this character, it agrees well in *form* with the *I. prolongata*, Blain., figured in Payraudeau's *Moll. de Corse*; but the colour of this (dark blue) is very different (p. 97) from mine. Philippi at the same time quotes the *I. prolongata* in Payraudeau as identical with his, which in colour, "pallide violacea," is similar to the Irish specimens, hence named *pallida*. This author again refers to what Blainville figures as one of the forms of *I. fragilis* (Man. Malac. tab. 37 bis. fig. 1) for a representation of his *I. nitens*. Philippi's diagnosis of this species is, "Testa ovata, obtusa, anfractibus omnibus valde rotundatis, sutura profunda divisis, apertura semiovata, labro profunde exciso anglo columellæ cum labro acuto." Habitat, Sicily. Size of Irish specimens, 11 lines long, 8½ broad.



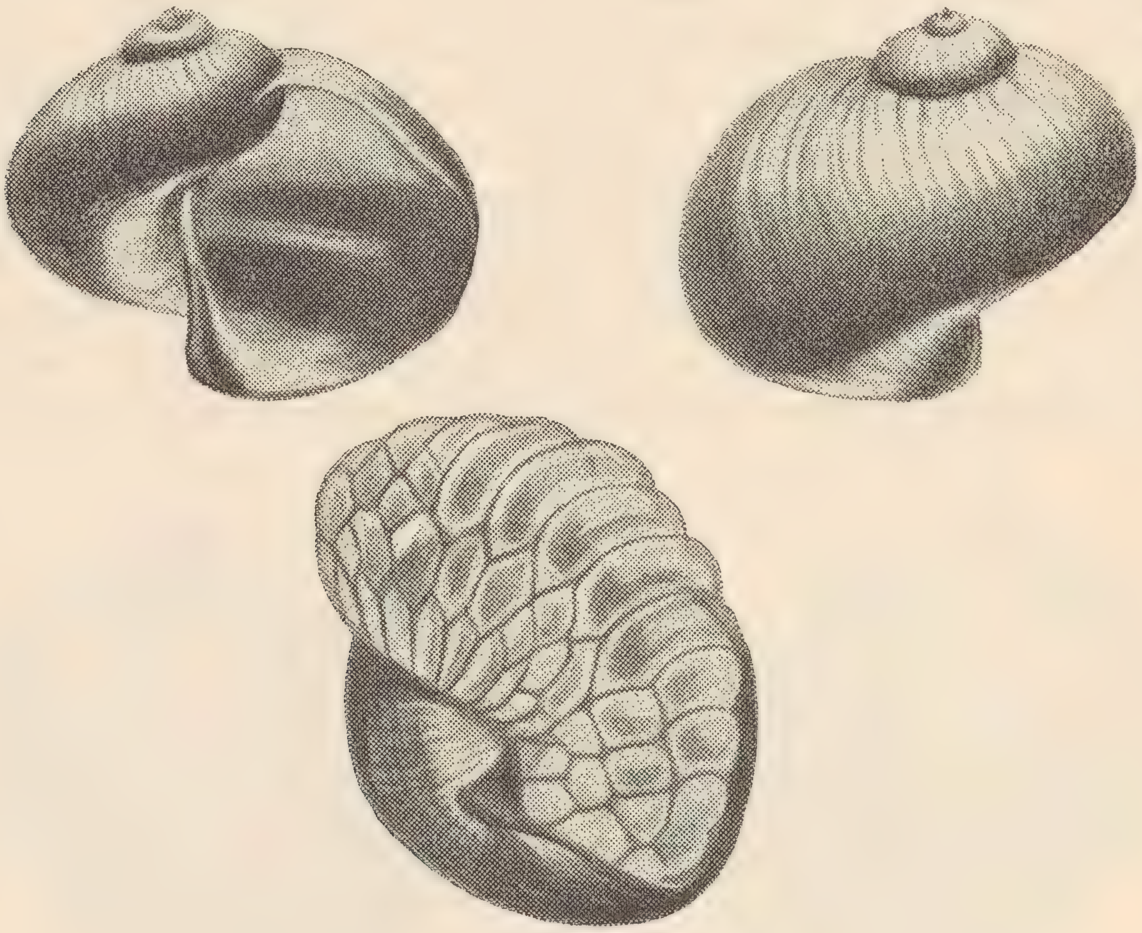
Janthina pallida Thompson. × 3. *Sennen.*

The genus *Ianthina* is in much confusion, which the present notes tend in no way to clear up: they are only intended to introduce a third species of this attractive genus to the British Fauna.

Several specimens of *pallida* were taken last year in Cornwall as recorded in this *Journal* on p. 268. J. T. Marshall had Cornish examples in his collection but they do not seem to have ever been recorded.

I have thought it worth while also to publish some excellent figures of *J. britannica* F. and H., which were found at the same time as *pallida* and the new British species *planispirata* A. Adams & Reeve.

The figures given are all drawn by Mr. G. L. Wilkins.



Janthina britannica, F. and H. × 2.
Sennen, and float.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN AND IRELAND.

679th Meeting held at the British Museum (Nat. Hist.), London, 4th January, 1947.

Dr. Hopwood, President, in the chair.

Dr. Kathleen White gave a demonstration on the anatomy of a new marine bivalve.

680th Meeting held at the British Museum (Nat. Hist.), London, 1st March, 1947.

Dr. Hopwood, President, in the chair.

The President announced the death on 27th February of Major M. Connolly, a member of the Society since 1913, President 1929–1930, and Vice-President at the time of his death.

The following were elected to membership :—

Mr. R. S. Newall, F.S.A., Fisherton Delamere House, Wylye, Wilts.
Miss L. E. Wagge, B.Sc., Kings College, London, W.C. 2.
Mr. Nigel Nicholson Millguard, Tiverton, Devon.

Mr. Verdcourt read a paper " *Aplexa hypnorum* in Bedfordshire ".

681st Meeting held at the British Museum (Nat. Hist.), London, 3rd May, 1947.

Mr. A. E. Ellis, M.A., Vice-President, in the chair.

The following papers were read :—

" Notes on *Planorbis corneus* L.", by Mrs. N. F. McMillan.
" A New South African Volutid," by J. R. le B. Tomlin, M.A.
" A New South African Cymatiid," by J. R. le B. Tomlin, M.A.
" *Cepæa nemoralis* and *Phytia myosotis*," by Mrs. N. F. McMillan.

682nd Meeting held at the British Museum (Nat. Hist.), London, 7th June, 1947.

Dr. Hopwood, President, in the chair.

The following were elected to membership :—

Mr. B. O. Wymer, 46 Mortlake Road, Kew, Surrey.
Professor A. v. Grossu, D.Sc., Str. Pestalozzi 14, Timizoore, Roumania.

Papers read :—

" Further extension in the range of *Crepidula fornicata* L.", by G. L. Spooner.

" The *C. nemoralis* population of a gorse bush " and " Further notes on *Planorbis corneus* in Wirral ", by Mrs. McMillan.

" Further notes on *Bythinia tentaculata* in closed ponds," Ead.

683rd Meeting held at the British Museum (Nat. Hist.), London, 22nd November, 1947.

Dr. Hopwood, President, in the chair.

Dr. Siro Fez y Sanchez, Valencia, Spain, was elected to membership.

The following papers were read in title :—

" Note on the spread of Land Mollusca," by B. Verdcourt.
" Mollusca in Thermal Pools at Matlock Bath," by T. Warwick.
" Ecology of *Limapontia capitata* Müller," by Mrs. N. F. McMillan.
" *Physa acuta* Drap. without shell," by Dr. Feliksiat.
" *Retinella nitidula* m. *sinistrorsum*," by A. E. Ellis.
" Dimensions of *Anodonta minima* Millet," by A. E. Ellis.
" Enemies of Mollusca," by A. S. Cook.
" L. St. G. Byne, 1872–1947," by R. Winckworth.
" Mollusca of a temporary pond," by Mrs. N. F. McMillan.
" *Janthina* in Cornwall," by W. Fowler.

684th Meeting held at the British Museum (Nat. Hist.), London, at 2.30 p.m., 20th December, 1947.

Dr. Hopwood, President, in the chair.

The following nominations for membership were read :—

Miss Stella M. Davies, 63 Beechwood Road, Sanderstead, Surrey.
(*Sponsors* : A. E. Salisbury and Mrs. McMillan.)
Miss Ursula M. Grigg, Bruton House, Mortimer West End, Nr. Reading.
(*Sponsors* : A. E. Salisbury and Mrs. McMillan.)
Dr. Anton H. Bruim, Universitetets Zoologiske Museum, Kobenhavn.
(*Sponsors* : J. R. le B. Tomlin and A. T. Hopwood.)
Dr. J. O'Neil Millott, Ph.D., B.Sc., A.R.I.S., 23 Sandy Lane, Boughton, Chester.

The following were elected to membership :—

Mr. A. Martin, Bishop's Stortford.
E. Guiler, 123 North Road, Bloomfield, Belfast.
Mr. J. H. Pantin, 25 Bentley Road, Cambridge.

Papers read :—

" A note on the Shell Collection of the late Rev. E. G. Alderson," by Arthur Blok and T. Pain.

" Prolonged dormancy of *Planorbis corneus* L. and *Lymnaea peregra* Müller," by G. L. Wilkins.

" *Succines elegans* Pfr. in Herts," by L. W. Stratton.

685th (Annual) Meeting held at the Apartments of the Linnean Society, Burlington House, Piccadilly, W. 1, 21st February, 1948.

The President, Dr. A. Tindell Hopwood, in the chair.

The Minutes of the previous Annual Meeting were taken as read.

Election of Scrutineers.

Mr. A. Blok, O.B E., and Lt.-Col. Bensley were elected Scrutineers.

Election of Auditors.

Dr. A. T. Hopwood and Mr. Castell were elected Auditors.

Elected to Membership.

Miss Stella M. Davies.
Miss Ursula M. Grigg.
Universitetets Zoologiske Museum Kobenhavn.
Dr. J. O'Neil.

The President, referring to the ballot paper, explained that his name appeared for the Presidency, but under the Rules he could not be elected for three consecutive years, and with several other members had pressed Mr. Tomlin to stand for election for a second term ; up to to-day's meeting of the Council Mr. Tomlin could not see his way to accept nomination : he had, however, been induced to yield and the meeting's approval was asked to substitute Mr. Tomlin's name for his own on the ballot paper as Council's nomination for that office. The President's remarks were received with general applause.

Dr. Hopwood then announced that with the full approval of Council and as a further mark of recognition and appreciation the Council recommended that Mr. Tomlin's name be added to those holding the honour of Honorary Membership, Mr. Tomlin having completed over forty years as Hon. Editor to the Society, from which office he was now retiring. Dr. Hopwood therefore moved from the chair :—

That Mr. Tomlin be and is hereby elected, as a token of the Society's grateful appreciation, to Honorary Membership of the Society.

This resolution was passed amidst loud applause, several members adding appreciative remarks both as to the work Mr. Tomlin had done for the Society and the help he had and is always giving to members individually.

Reports were received from the Yorkshire Branch and the Staffordshire Branch and were adopted.

Mr. Gardiner wrote to express his regret at not being able to attend the meeting and his Report as Marine Recorder was presented on his behalf.

The Treasurer then gave a résumé of the Society's finances and presented the audited accounts for the year ending 31st December, 1947, which were adopted.

The President then announced the result of the Ballot as follows :—

President.—J. R. le B. Tomlin, M.A., F.R.E.S.

Hon. Secretary.—Mrs. McMillan.

Hon. Treasurer.—A. E. Salisbury, A.M.I.E.E.

Hon. Librarian and Curator.—W. Thurgood.

Hon. Recorders.—Non-marine : A. E. Ellis, M.A., F.L.S. Marine : Alan P. Gardiner, B.Sc.

Council.—Prof. G. D. H. Carpenter, B.A., M.D. ; Mrs. E. M. Morehouse ; Miss K. M. White, B.Sc., Ph.D. ; A. Blok, O.B.E., B.Sc. ; A. G. Wrigley ; G. L. Wilkins.

Mr. Tomlin, the new President, replying to the unanimous applause which greeted the announcement of his election, thanked the Society for the honours they have conferred upon him in electing him to Hon. Membership and to the Presidency, recalling with pleasure the work he had been able to do for the Society and the friends he had found among its members. He asked Dr. Hopwood to retain the chair for the remainder of the meeting.

Dr. Hopwood, the retiring President, then addressed the meeting. Mr. Blok spoke at some length, proposing a hearty vote of thanks to Dr. Hopwood for his address and for all the work he had done for the Society : this was seconded by Lieut.-Col. Bensley. The Treasurer, supporting the proposal, remarked that Dr. Hopwood had been very helpful during these years of removal of the Society's properties to Leeds, and in the necessary negotiations connected therewith, in many a way the members of the Society knew not of.

The Resolution was passed with unanimous applause.

The following exhibits were made, exhibitors remarking on points to be noted relative thereto :—

By Mr. Tomlin : Interesting and rare shells including fine specimens of *Thatcheria mirabilis* Angas.

By Mr. Verdcourt : *Vertigo angustior* Jeffreys from a swamp in Bedfordshire, and species associated therewith : also some fifty excellent photos of radulæ of mollusca, including *Assiminea grayana*, *Amnicola taylori*, *Carychium tridentatum*, embryonal *Limax maximus*, *Conus andamanensis*, *Marisa cornu-arietis*, and *Haiotis tuberculata*—the last photographed in polarized light.

By Mr. Stratton : *Anodonta cygnea* L. with blister and stalked pearls from lake in Hatfield Park, Aldenham, Herts.

By Mrs. McMillan : Catalogue of British Shells belonging to J. T. Swainson, the father of William Swainson, *circa* 1780–1810.

By Mr. T. Pain : *Pomacea urceus* Müller, Trinidad, British Guiana, French Guiana, Venezuela (Dall's locality " Mississippi " quoted by Alderson is erroneous).

By Mr. Wilkins : Species of *Janthina* and drawings from specimens of *J, planispirata* and *J. britannica* taken at Sennen.

ANNUAL REPORT.

This is the 71st Annual Report of the Council.

The Trustees of the British Museum have continued their permission for meetings to be held in the Board Room of the British Museum (Natural History).

Recorder's Report (Non-marine Mollusca).

West Cornwall (1) : *Theba cantiana* (Rock near Padstow, dead shell, R. S. Newall).

East Sussex (14) : *Carychium minimum* (Cuckmere Valley, H. E. Quick).

Hertford (20) : *Succinea elegans* s.s. (Bishop's Stortford, L. W. Stratton, det. H. E. Quick).

East Norfolk (27) : *Vertigo substriata*, *Cecilioides acicula*, *Hydrobia jenkinsi* (A. E. Ellis), *H. ventrosa* (Yarmouth, Norwich Castle Museum).

Bedford (30) : *Testacella scutulum* (Bedford, H. F. Barnes), *T. maugei* (Ampthill), *Vallonia pulchella* (subfossil), *Vertigo angustior* (Sundon Swamp, B. Verdcourt).

Glamorgan (41) : *Carychium minimum* (Oxwich), *C. tridentatum* (Swansea), *Leuconia bidentata* (Swansea, H. E. Quick).

Brecon (42) : *Vitrina major* (Capel-y-Ffin, 1,400 feet, H. E. Quick).

Denbigh (50) : *Lauria anglica* (Gresfad, J. O. N. Millott).

Nottingham (56) : *Anodonta minima* (R. Lene, Papplewick, 1918, J. O. N. Millott).

Dumfries (72) : *Limax arborum* (Thornhill), *Trichia striolata* (Duncow), *Vallonia pulchella* (Duncow), *Carychium minimum* and *C. tridentatum* (Duncow and Thornhill, H. E. Quick).

Marine Recorder's Report.

Lists of species which are no longer found or which have become rare in particular places would be of great interest, particularly if possible causes are given. Mrs. McMillan has sent me her paper on Greenisland, co. Antrim, in which the following species have not been previously marked in our maps for Region XI. Many species only found dead probably from the estuarine clay.

Class *Loricata.*—5, 7.

Class *Gastropoda.*—6, 7, 10, 11, 12, 13, 26, 36, 37, 39, 40, 43, 53, 56, 57, 58, 70, 71, 80, 87, 90, 157, 181, 182, 184*a*, 184*b*, 211, 214, 219, 226, 228, 238, 247, 273, 288, 290, 291, 313, 330, 332, 369.

Class *Lamellibranchia.*—16, 20, 96, 102, 107, 111, 116, 117, 123, 137, 141, 145, 148, 156, 159, 170, 171.

Dr. Comfort sends a list from Gairloch, Region XII, of dead shells, the following not hitherto marked : 7, 8, 48, 74, 178, 184*b*, 21, 32, 66, 108, 118, 144, 147. There were seventy-four species in all.

Colonel C. J. F. Bensley sends me a list of twenty-four species from Merioneth and Cardigan, Region IX*b*, on which the following are hitherto unmarked. Class *Gastropoda* : 43, 208. Class *Lamellibranchia* : 4, 124, 141, 143.

The numbers all refer to Winckworth's List in this *Journal*, vol. xix, No. 7, June, 1932, pp. 211–252.

In this Report it will be seen how many common species had not been marked in the maps owing to the lack of recent first hand records.

It has seemed more convenient to use the numbers given in Winckworth's List, especially if entered in the order of the List.

I fail to see the use of inserting records which can be seen in Jeffreys and other old books and similar sources of information, but which have not been noted of late. In my collecting life many species are no longer found in places where I used to find them twenty years ago or less. Unfortunately this is becoming increasingly common owing to the march of civilization and oil ! If observers were to write the numbers of the species given in Winckworth's List instead of the names, it would be less trouble for them, and if these numbers were given in the order of the list it would save much wear and tear of the maps caused by repeated turning, to say nothing of the recorder's time.

ANNUAL REPORT OF THE YORKSHIRE CONCHOLOGICAL SOCIETY.

(A BRANCH OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN AND IRELAND.)

This was presented to the 51st Annual Meeting, held on 4th October, 1947, in Geology House, Hilary Place, Leeds, 2.

A visit was paid to the Yorkshire Museum, York, on 15th March, 1947, to inspect the Sowden and Hey collections of non-marine mollusca. The visitors were welcomed by the Keeper, Mr. R. Wagstaffe. A good deal of preparatory work in setting out the collections had been done by two members, Messrs. Arthur Smith and C. F. Sweetman, to whom the Society's thanks are due. Later in the proceedings the welcome of the Yorkshire Philosophical Society, under whose ægis the Museum operates, was cordially expressed by two of its officials, the Earl of Feversham and Sir Francis Terry. On 7th June an excursion to Little Smeaton was much enjoyed. The company included several members of the Doncaster Scientific Society, brought by Mrs. Morehouse. Seventeen species of mollusca, including *Cecilioides acicula*, were recorded.

An excursion to Ripley on 19th July did not attain its principal object, to confirm the occurrence of *M. margaritifera* L. In this *Journal*, vi, 20, January, 1889, H. P. Fitzgerald said: "This extremely local species occurs sparingly in the R. Nidd at Ripley, one which I gave to Mr. Standen that gentleman thought to belong to var. *roissyi* Mich." Two of our party, Messrs. Don Fisher and Bussey, spent some time wading in the shallows below Killinghall Bridge, but were unsuccessful. Near the bridge three freshwater and seven land species were taken or recorded. Later on a visit to the lake in Ripley Park produced four freshwater and three land species.

ANNUAL REPORT OF THE NORTH STAFFORDSHIRE BRANCH.

No new records for the County have been received. The President, Dr. W. E. Alkins, has been busy on a number of measurement series of *Cl. cravenensis* and *Cl. bidentata* collected by him in Wharfedale. During the autumn and winter he has spoken on his shells, and shown them to members of the Oakamoor and Farley Women's Institute, and to a meeting of Boulton's Senior Staff; also to the Science Club of Leek, and Westwood Hall Girls' High School. He does not state how many converts were made!

Mr. W. Hill, of Leek, reports *V. pygmaea* under stones on the hillside opposite Thor's cave in the Manifold Valley, where he first found it in 1924. *Theba cantiana*, which he found in 1943 on a piece of waste ground at Cheddleton, is still thriving.

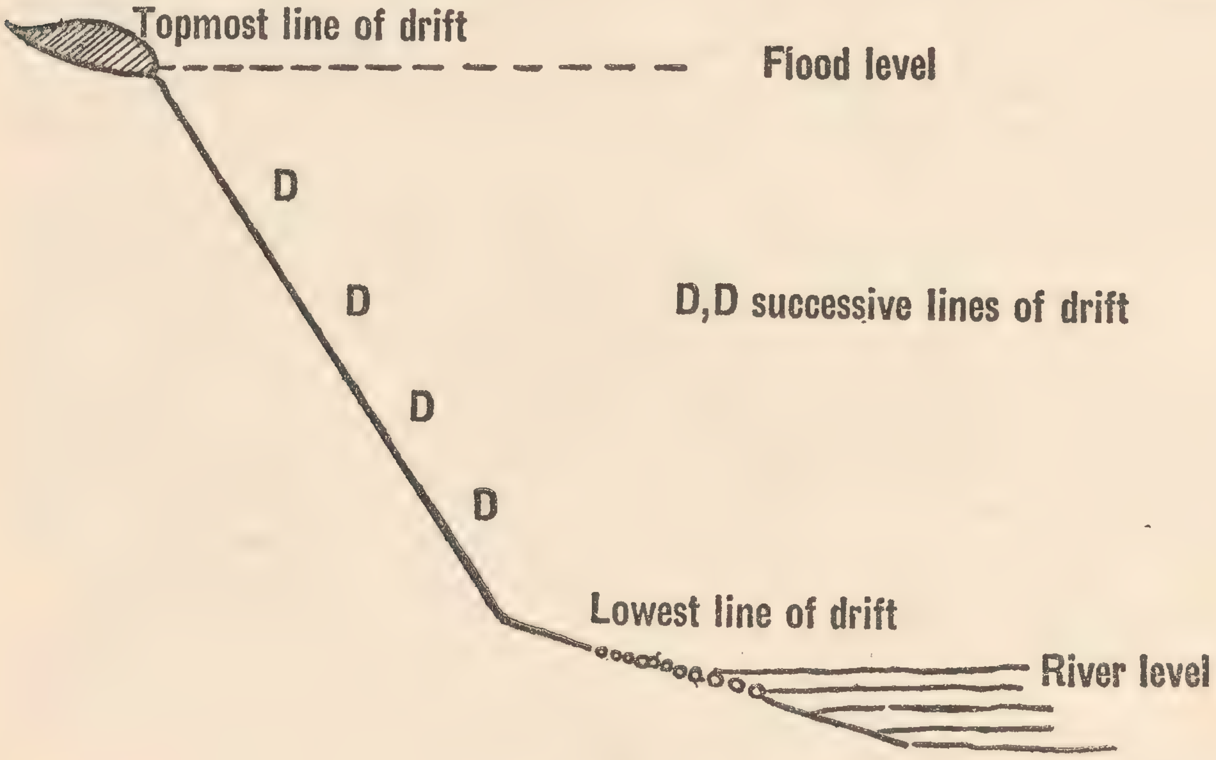
During the hot weather last August I found numbers of *Milax sowerbii* drowned in the water that had accumulated in an Anderson shelter in my garden. In October I found a score or more of the same species that had suffered a similar fate. On closer examination I found numbers of "rat-tailed" maggots, larvae of *Eristalis tenax*, a species of hover-fly, attached to the slugs. Quite recently I collected a few *Planorbis corneus*, the largest of which measured 1½ in. in diameter.

B. Bryan,
Hon. Sec.

MOLLUSCA IN FLOOD DÉBRIS.

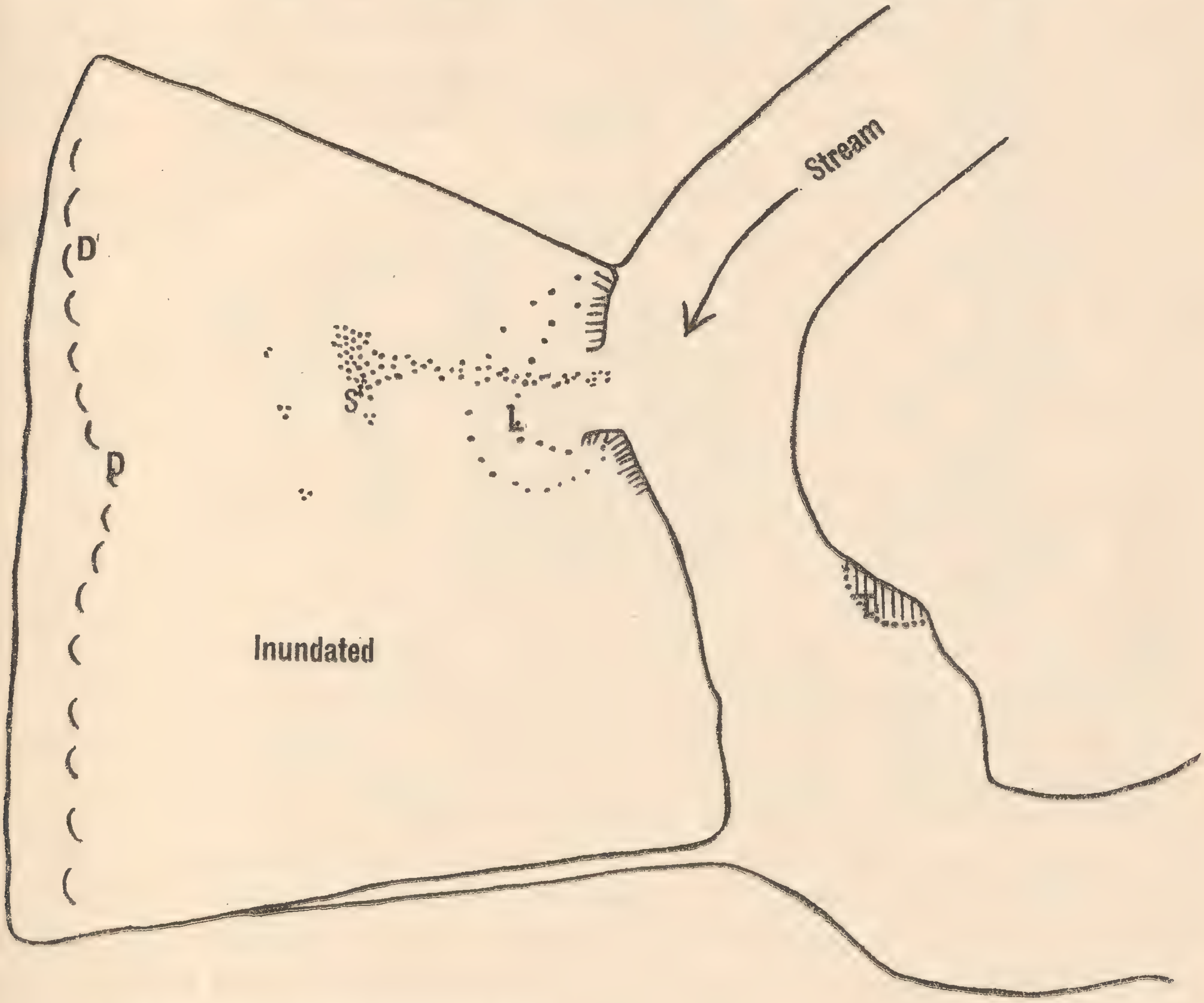
By Alex. Comfort, M.B.

The recent extensive flooding of grassland in many parts of the country has made it possible to examine large amounts of drift and waterborne débris. Such material has long been used as a source of data and specimens in the study of mollusca especially the smaller land forms. Its composition has always been of particular interest to palæontologists, and expeditions surveying recent shells in little-known areas have usually to rely on drifted material of this type for data regarding the "interior" and its fauna. The character of batches of drift left by the floods in the valleys of the Cam, Thames, and Lea during Spring, 1947, throws a good deal of light both upon the mode of formation of flood deposits and upon their evaluation.



River Thames, near Teddington.

In the case of rivers which derive their tributaries from surface drainage, largely artificial ditches, the land fauna represented in drift is very different, both numerically and in character, from the overall molluscan population in the drainage area. Molluscs which can climb are naturally less subject to danger from flooding, and there is a disproportionately high representation for genera living in vegetable refuse and among grass and grass roots. Thus the débris of all three rivers, though derived from drainage basins of differing nature, has a very uniform character, a few species, *Cochlicopa lubrica*, *Vallonias*, *Cecilioides acicula*, *Trichia hispida*, and *T. striolata* being predominant, with a sprinkling of *Vertigo*; selection does take place according to habit, *Pupilla muscorum* being present in bulk, while wall and rock-climbing forms like *Lauria cylindracea* and *Clausilia rugosa* are much scarcer. The geophilic community is selected, and is naturally represented both by fresh and by long-dead shells, but the larger and geophobe forms appear also, as old or long-dead material. In dealing, therefore, with an area where the ecology of the drifted species is not known, a certain amount could be inferred from the relative proportions and condition of the shells. More important, from the standpoint of fossil and subfossil drifts, is the mixture of specimens from colonies having a widely differing facies. In the case of *Cochlicopa lubrica* from Thames drift, it was possible to separate four or five groups having uniform conchometric characters, and probably representing local but widely dissimilar populations, from single batches of débris. The same was true of *Trichia hispida*. The importance of this pooling of local material is that in examining a deposit known or suspected to be alluvial it is the presence of isometric groups, not the general measurements of the whole sample, which has to be considered in assessing variation. The differences between *Carychium minimum* and *C. tridentatum* come out very clearly in flood material, when general collecting is likely to reveal a very heavy preponderance of one or the other in any selected area—from this point of view the study of fossil alluvium gives, if anything, a clearer overall picture than any survey which does not go at great length into local differences of habit. On the other hand, the sorting-action of flood water, like that of wind in the case of the Strandhill shell deposits in Ireland, can give a very confusing imitation of progressive change in shell form if the other evidence is insufficient to show the true state of affairs. In the case of the Thames material, pooling was



D, D	Peripheral lines of drift.
S	Sand and shell bank left by receding water.
L	Zones of large *Unionidæ*, etc., round point of breakthrough.
T	Deposit at point of turbulence (River Roding).

predominant at points of turbulence, recognizable by the high proportion of freshwater forms mixed with land material, but the lines of drift deposited as the water fell were entirely different in character, with a marked predominance of land forms, especially dead shells which contain air and float, and a sorting of smaller forms at successive levels into batches of approximately the same individual mass and specific gravity. Levels of this type are probably rare except in holocene deposits, or where the course of a stream changes after the subsidence of floods, since erosion of the bank at later high water points would remove them, but where they occur on the slope of a fairly steep bank the sorted deposits would give a misleading picture of progressive variation if they were not recognized for what they are.

The pattern followed by these levels seems to be fairly constant. The highest deposits contain the most buoyant material—large vegetable matter, chestnuts, and recently dead, air-filled shells of helices, and the lowest, stones, grit, and lamellibranch shells, especially single valves which drift along the bottom plane-wise. Where the flood subsidence has been slow, new lines of light material are deposited intermediately, but in places where the drop was rapid the middle ranges are arranged in order of descending lightness, the minute forms with small area and thick shells moving on the whole with the heavy fraction. Another problem, where the assessment of fossil sequences is concerned, is the rapid migration of live slugs and snails into flood débris after it is deposited (within forty-eight hours in some cases) and the "resurrection" of long-dead and even of fossil material from old alluvium. Clearly, however, it is the uppermost zone which is most likely to be secondarily colonized and the lowest and heaviest which will contain the oldest material.

All these processes could be watched in detail during the recent floods. The conclusions which appear from the observation are these: that no conchometric data should be based on alluvium, unless well-marked isometric groups can be picked out; that in recent drift a certain amount can be learned about the habit of unknown forms by a study of the percentage of old and of fresh shells represented; that in making any such observations on fossil and subfossil material it is safer to identify the mixed deposit characteristic of zones of turbulence than to rely on a single batch which may have been mechanically sorted by drifting; and that resurrection of material from subfossil deposits is sufficiently common to be taken into consideration when describing the contents of alluvium of known age. These findings do not apply in such a simple form to drift thrown up at the edges of large inundated areas such as water-meadows. Wind plays a large part in sorting such drift, air-filled shells being selected while small material is widely scattered, collecting again if drainage sets up currents and deposits local sandbanks; large bivalves and living univalves such as *Viviparus* are concentrated into fan-shaped areas round the point of weakness in the river bank. The application of these principles to known alluvium might give a certain amount of new information on the behaviour of extinct species.

ACCOUNTS FOR THE YEAR ENDING 31st DECEMBER, 1947.

Income and Expenditure Account.

Dr.	£	s.	d.	£	s.	d.
To Annual Subscriptions—						
For 1947	50	5	0			
Paid in 1946	10	1	0			
Arrears	7	8	0			
				67	14	0
,, Sales				90	16	11
,, Transfer from Life Membership Fund				20	0	0
,, Transfer from Research Fund				40	0	0
				£218	10	11

	£	s.	d.	£	s.	d	£	s.	d.
By Publication and Distribution—									
Vol. 22, part 9	51	17	8						
Do. Reprints	7	9	2						
				59	6	10			
Vol. 22, part 10	52	4	1						
Do. Reprints	5	16	1						
				58	0	2			
							117	7	0
,, Printing and Stationery							2	18	10
,, Fire Insurance								10	0
,, Zool. Record								8	0
,, Zool. Society (Record Donation)							2	0	0
,, Removal Expenses (Carriers a/c)							35	15	6
,, Removal Expenses (Travelling and Sundries)							4	4	6
,, Officers' Expenses							8	11	4
,, Balance being excess of Income over Expenses							46	15	9
							£218	10	11

Cr.

Life Membership Fund.

	£	s.	d.
To Amount of Fund, 1st January, 1947	449	6	0
,, Donations and Fees	23	0	0
,, Dividends and Interest	20	0	0
	£492	6	0

	£	s.	d.
By Transfer to Income and Expenditure Account	20	0	0
,, Amount of Fund, 31st December, 1947	472	6	0
	£492	6	0

Research Fund.

	£	s.	d.		£	s.	d.
To Amount of Fund, 1st January, 1947	284	2	7	By Transfer to Income and Expenditure Account	40	0	0
,, Dividends and Interest	12	13	5	,, Dividends and Interest (accumulated)	56	16	0
				,, Amount of Fund, 31st December, 1947 (Capital)	200	0	0
	£296	16	0		£296	16	0

BALANCE SHEET.

Liabilities.

	£	s.	d.	£	s.	d.
Annual Subscriptions in advance				1	4	0
Life Membership Fund				472	6	0
Research Fund				256	16	0
Transfer from Research Fund				100	0	0
Balance Income and Expenditure Account—						
As on 1st January, 1947	191	13	9			
For 1947	46	15	9			
				238	9	6
				£1,068	15	6

Assets.

	£	s.	d.	£	s.	d.
4% Funding Loan (cost)				350	0	0
2½% Defence Bonds (cost)				200	0	0
3½% War Loan (cost)				40	0	0
Cash at Bankers—						
National Provincial	117	10	6			
Post Office Savings Bank	351	5	0			
In hand	10	0	0			
				478	15	6
				£1,068	15	6

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C. P. CASTELL.
20th February, 1948.

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Hon. Treasurer.
14th February, 1947.

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